Henry C. Pearson, F. R. G. S., Founder

Edward Lyman Bill, Publisher

INDIA RUBBER WORLD

William M. Morse, Editor

B. Brittain Wilson, Business Manager

Volume 88 | **April 1, 1933** | **Number 1**

Contents

Articles

Departments

Departments

Published on the first of each month by Federated Business Publications, Inc., 420 Lexington Ave., New York, N. Y. Publishers of *Automotive Electricity, Fine Arts*, INDIA RUBBER WORLD, *Materials Handling & Distribution, Music Trade Review, Novelty News, Premium and Specialty Advertising, Radio Digest, Radio Merchant, Rug Profits, Sales Management, Soda Fountain, Tires;* and operates in association with *Building Investment, Draperies*, and *Tire Rate Book*. Cable Address, ELBILL, New York. Subscription $3.00 per year postpaid in the United States; $4.10 per year postpaid to Canada; $3.50 per year postpaid to all other countries.

INDIA RUBBER WORLD

Published at 420 Lexington Avenue, 400 Graybar Building, New York, N. Y.

Volume 88 **New York, April 1, 1933** **Number 1**

Rubber Thread[1]

Extruded Latex Thread Compared with Cut Thread

E. A. Murphy[2]

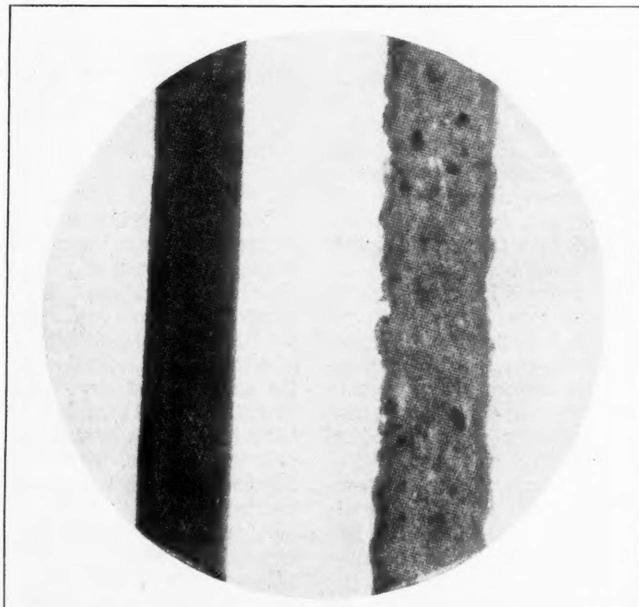
EXTRUDED latex and square cut rubber thread are compared by the author in the following abstracts.

The size of extruded threads to be produced is controlled by several factors such as the concentration and viscosity of the latex mixing; the head of latex with respect to the orifices; the dimensions of the nozzles; and to some extent the composition of the coagulant. Due allowance must also be made for shrinkage in drying. The speed of extrusion is also dependent on these factors. The rate of extrusion for any given orifice and hence the size of thread will be dependent on the pressure at which the latex is supplied. By varying this it is possible to obtain a range of thread counts from the same orifice. Usually the conditions are adjusted to give an extrusion rate of between 30 to 40 feet per minute.

As there is almost inevitably a small amount of waste material obtained at the commencement of the run, the plant, once started, is kept in continuous operation for long periods, even several days. Thus, each orifice will produce 8 to 10 miles of thread continuously per day.

It will be realized that the conditions of manufacture for latex thread are widely different from those required for cut thread. In place of the heavy machinery used in the older process, a comparatively light plant is employed, which rarely demands more than a few horse power for driving it. Mixing mills are replaced by tanks fitted with adequate mechanism for stirring liquids; calenders and cutting lathes by coagulating tanks, and extrusion nozzles. It should not be inferred, on the other hand, that because of the apparent simplicity of the latex process it does not require the care and technical control that are necessary in the dry rubber process.

Careful check must be kept on the preparation of dispersions and mixings and also on the factors governing extrusion that have been enumerated. Attention must also be given to the maintenance of constant drying and vul-



Trans. Inst. Rubber Ind.

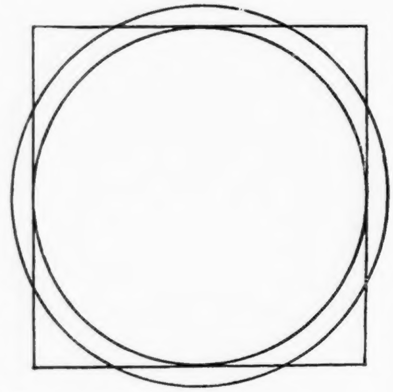
LATEX ROUND SQUARE CUT

Fig. 1. Magnified Photographs of 90's Round and Square Cut Latex Thread

[1]Presented at a meeting of the Midland Section of the Institution of the Rubber Industry, held at Leicester, October 27, 1932. Published in *Trans. Inst. Rubber Ind.*, Dec., 1932, pp. 328-44.

[2]Dunlop Rubber Co., Fort Dunlop, England.

canizing conditions. When this is done, however, it is possible to produce thread continuously for long periods, and yet maintain a high degree of uniformity in its cross sectional area and physical properties. For example, the diameter of 100's count thread is ten thousandths of an inch. An increase or decrease of one half of one thousandth of an inch, i.e., variation of $\pm$ 5%, means an alteration in count from 96's to 105's. Therefore for 100's thread to be manufactured commercially it is necessary to keep well within these limits, i.e., within a range of one thousandth of an inch. That this is possible in the continuous production of several miles of latex thread allows its manufacture to rank with those of the highest mechanical precision.



Trans. Inst. Rubber Ind.

Fig. 2. Sections of Square Cut and Round Thread of the Same Count

The advantages, if any, which the manufacture of latex thread has over ordinary cut thread, from a consumer's point of view, may now be considered.

Apart from differences in the physical properties of the 2 types of thread there are other important features of interest associated with the newer material. In the first place it is possible to obtain latex threads in much longer lengths than in the case of cut thread. The limits of length are, in fact, only governed by the ability of the thread coverer and elastic web manufacturer to handle long lengths efficiently. Secondly the extrusion process enables a much wider range of counts to be manufactured. Reference to the gage tolerances for 100's count thread has already indicated the possibility of manufacturing extremely fine rubber threads from latex. Until about 2 years ago the finest count available was probably in the region of 58's. Today garments are on the market containing 100's and even 125's count thread. Both the production and utility of thread of this degree of fineness would have been regarded as of little practical importance a few years ago. The introduction of these ultra fine rubber threads has, indeed, set up a new era in the elastic industry. It has provided the garment manufacturer with a thread fine enough to be woven or knitted into fabrics without altering their normal appearance, but which imparts to them the property of extensibility in 2 directions. It is not difficult to imagine that material having these characteristics should find immediate application in the corsetry trade where it is becoming firmly established. Other uses are found in the manufacture of bathing dresses and undergarments, to impart a local grip or support, for instance, at the ends of the sleeves, and of knitted dress fabrics and upholstery material.

The obvious utility of fine count thread has prompted the desire to produce counts of a similar order by the cut thread process. While the efforts that have been made in this direction have undoubtedly met with some success, difficulties associated with the cutting operation increase rapidly with diminishing size. Small variations in the cut face, which are ordinarily of negligible importance in a thread of average size, become relatively very large on the cut face of a 100's thread. A similar condition also applies to irregularities on the sheet face, such for example, as those due to cloth marking. This point is illustrated in Figure 1, which shows highly magnified sections of 90's round latex extruded thread and 90's cut thread.

Although variations in contour of the type exhibited by cut thread have undoubtedly a detrimental influence on the ability of the thread to resist chafing and aging, it has been suggested that the very smoothness of surface exhibited by extruded round thread will give rise to complications in weaving and covering, owing to there being insufficient anchorage for the covering material. This does not appear, however, to have presented any considerable difficulty which is demonstrated by the successful results of extensive manufacturing trials that have been made both in America and Europe.

One problem which immediately presents itself to the consumer in using round thread is the relation between the counts of round and square cut thread. The count of a rubber thread in the elastic industry is taken as the number of threads which can be placed side by side on an inch scale. It is, therefore, a measure of the side of a square thread, but of the diameter of a round thread which means that the cross sectional area of a round thread is less than that of a square cut thread of the same count. The relation is illustrated in Figure 2. Although the inner circle has the same count as the square, the outer circle has the same cross sectional area. In giving the count of a round thread it has therefore become customary also to state what would be the count of a square cut thread of the same cross sectional area. Thus a 40's round thread is labeled 40/46's, the second figure indicating that it is equivalent in cross sectional area to a 40's square cut thread.

The factor for converting square counts to the equivalent round counts is 0.887, and Table 1 shows the relation over a wide range of counts. It will be noted that the numerical differences between the equivalent counts increases considerably with diminishing count. For instance, while there is only a difference of 2 counts between 20's square and the corresponding round thread, in order to produce a square cut thread equivalent to 100's round, it would have to be cut to 112's count.

TABLE 1

Square count $\times$ 0.887 = round count.

Square Count	Round Count	Square Count	Round Count
18	16	42	38
20	18	44	39
22	20	46	40
24	22	48	40
26	23	50	46
28	24	54	48
30	26	60	54
32	28	70	62
34	30	80	72
36	32	90	80
38	34	100	88
40	36	112	100

The remaining features of latex thread to be discussed are perhaps the most important, i.e., its physical properties, particularly in relation to those of a cut thread. Before considering this subject it is of interest to note a number of points of difference in the manufacture of the 2 threads. In the first place the rubber in the case of a latex thread is subjected to no mechanical working. Because of this point, the unvulcanized dry threads frequently have a tensile strength of 1,000 pounds per square inch, which incidentally helps to explain why they may be handled on conveyers and collected in trays, without fear of permanent deformation. Secondly, a much wider range of substances may be incorporated in a latex mixing than in an ordinary milled stock, which not only influences the times and temperatures of vulcanization, but which is capable of imparting certain physical properties to the rubber that are not otherwise obtainable. Thirdly, latex extruded thread is shaped before vulcanization so that there is a vulcanized skin, as it were, over its whole surface. This and the absence of sharp edges undoubtedly contributes to the exceptionally good resistance to chafing which is normally associated with round thread.

All these factors together with others somewhat less clearly

defined enable a thread to be produced, having excellent aging properties, and of much greater mechanical strength than that exhibited by the average cut thread.

No attempt will be made to discuss the physical properties of thread in detail, but figures are given in the following tables which are likely to be of most immediate interest to the thread consumer.

Table 2 gives a comparison of the more important tensile properties of typical 40's white and brown cut square threads, with those of a 36/40's round thread, all of which have the same cross sectional area.

TABLE 2

Thread	Latex Round 36/40's	Square Cut White 40's	Square Cut Brown 40's
Tensile strength in lbs. per sq. in.	4,700	3,000	2,350
4 oz. weight test at 65° F. and relative humidity of 70	27	34	40.0
Pull in ozs. required to give 200% elongation on worked rubber	1.8	1.3	0.95
Pull in ozs. required to give 400% elongation on worked rubber	3.2	2.4	1.6

The first line shows the force in pounds per square inch of original cross section to break the threads, and it will be noted that the figure for the latex thread is twice that of the brown thread and appreciably greater than that of the white.

The results given by the "4-ounce weight test," which is fairly well known in the trade, are the lengths in inches to which 6-inch samples will stretch when subjected to a load of 4 ounces. As all 3 threads have the same cross sectional area, a direct comparison can be made of these figures. They indicate the latex material to be somewhat "more resistant" in tension than either of the other two. In spite of its resistance, however, the maximum elongation of the latex sample is in general equal to that of the white square thread, which it more closely resembles in its properties, than the brown type of thread. Thus, in braids or webs containing latex and cut white threads of the same cross sectional area and at the same degree of extension, although there would be the same marginal difference between the maximum elongations of the threads and their "working elongations," the material containing the latex thread would offer distinctly greater resistance to stretch. This is illustrated by the actual pulls given in Table 2 that are required to stretch the threads to 200 and 400% elongation. These figures in effect offer a direct comparison of the degrees of tightness or hardness which would be exhibited by braids or webs containing the 3 types of thread, but all having the same rubber content.

TABLE 3

Thread	40/46's Latex Thread	Square Cut White 40's Thread
Breaking load in ozs.	37.0	29.5
4 oz. weight test at 65° F. and relative humidity of 70	32.5	33.5
Pull in ozs. required to give 200% elongation on worked rubber	1.3	1.3
Pull required to give 400% elongation	2.9	2.4

In Table 3 the tensions and loads at definite elongations are given for a square cut white 40's thread and a latex round thread of the same linear count, i.e., 40/46's. The figures indicate that a fabric made up with the round thread at 200 and 400% elongation would only be slightly tighter than a material containing the same length of square thread at these elongations. It should also be noted that in spite of the smaller cross sectional area of the latex thread the load required for breaking it is appreciably greater than that for the square cut material. Thus it would be possible to substitute a round thread equivalent in cross sectional area to the inner circle of Figure 2, for a cut thread corresponding in area to the square, without altering the elastic properties of the finished material or impairing its life. In this connection it is of interest to compare the lengths per pound of the 2 threads. Assuming the specific gravity of both the round and square white threads to be 0.98, the lengths per pound of 40's square and 40/46's round thread are 1,260 and 1,600 yards respectively.

Reference to Table 2 indicates that the pulls required for 200 and 400% elongations are all determined on "worked" rubber. It is probably fairly well known that the degree of tightness of a thread that has not previously been stretched decreases considerably with the first few stretches and releases, but rapidly becomes more or less constant under subsequent stretching. Examples of this are found in Table 4, in which the pulls at 200 and 400% elongation are given on previously unstretched samples before and after being stretched 6 times to 600% elongation.

TABLE 4

Thread	Pull Required for 200% Stretch		Pull Required for 400% Stretch	
	Unworked Rubber Ozs.	Worked Rubber Ozs.	Unworked Rubber Ozs.	Worked Rubber Ozs.
Latex round 36/40's	2.2	1.8	5.3	3.2
Square cut White 40's	1.7	1.3	3.3	2.4
Square cut Brown 40's	1.2	0.95	2.1	1.6

While this effect probably does not influence the utility of a tension test which is intended to serve as a guide to the manufacturer when the rubber receives its first stretching on the loom or covering plant, it does appear to be of importance when an attempt is being made to compare the degrees of tightness of elastic fabrics in ordinary use.

Table 5 gives tensile and tension figures of 2 ultra-fine round threads in comparison with those of a square cut thread of the same order of count. In this case the 4-ounce weight test has been replaced by 1 ounce and 2 ounce loading tests. Here again the superiority in tensile properties of the latex material is evident.

TABLE 5

Thread	Latex Round 80/90's	Square Cut Thread 90's	Latex Round 90/100's
Tensile strength in lbs. per sq. in.	5,700	3,200	5,640
1 oz. weight test at 65° F. and relative humidity of 70	37	38	41
2 oz. weight test	44	43	46
Maximum elongation	950%	900%	950%

Before leaving the subject of physical tests, it is of interest to confirm that atmospheric conditions have an appreciable effect on tension figures, both on round and square cut threads. Table 6 gives a comparison of results obtained by the 4-ounce weight test after the test samples had been stored in atmospheres of different degrees of humidity. The differences indicated are considerable, and it is for this reason that the temperatures and relative humidities are stated in Table 2 in connection with the 4-ounce weight test.

The figures clearly indicate the slackening influence of moist atmospheric conditions on all 3 classes of thread.

TABLE 6

Thread	Latex Round 36/40's	Square Cut White 40's	Square Cut Brown 40's
4 oz. weight test at 66° F. and relative humidity of 70%	27	34	40
At 67° F. and relative humidity of 49%	25.5	33	37.5

Finally, mention must be made of the aging properties and resistance to laundering of latex thread, especially with reference to the fine counts. The extent to which the average rubber thread can withstand exposure to light, washing, and ironing is fairly well known in the elastic trade. It is not surprising, therefore, that when such fine threads as 100's and 125's counts first made their appearance, with the proposal that they should be incorporated in fine texture products, capable of being frequently washed and ironed,

(*Continued on page* 30)

Latex as a Bonding Agent[1]

W. H. Stevens, A.R.C.Sc., A.I.C.

BY THE use of rubber latex as a bonding agent is meant its application as a matrix material; that is, as a base material for constructional or binding purposes. It is appropriate to consider first the advantages obtained by using latex as a bonding agent. In most cases it is naturally the rubber from the latex that acts as the bonding material. The use of rubber in latex form follows from the readiness with which this rubber can be compounded and mixed with the fibrous materials, fillers, and so on, which it is required to bond. The watery portion of the latex mixture is afterward removed in the process of shaping the article.

It is interesting to inquire into the mechanism of latex rubber bonds. Being an aqueous dispersion of microscopic particles ($0 \cdot 5 - 2\ \mu$), latex is readily miscible with all watery liquors, dispersions, and emulsions. If the latter contain ingredients which "break," the rubber dispersion coagulation ensues, manifesting itself either as a local clotting or as a setting or "junketing" throughout the mass. In practice this change is prevented by the use of alkalies (anti-coagulants) and/or hydrophilic substances ("protective colloids"); or it may be merely postponed until the materials to be bound are all incorporated, when the shaping can, in certain cases, be effected conveniently by setting or "gelling" (coagulating) in a mold.

It is important to remember that in mixing 2 dispersions the dispersed phases are not intimately mixed Even after the water has been removed the separate particles may lie side by side and do not amalgamate. The mere fact of protecting the lyophobic disperse phase to obtain its dispersion must obviously protect it from itself and from the other disperse phases mixed with it. In the case of latex this results in the now often accepted view of the persistence of the globule entity on desiccation. It thus follows that reenforcement of the latex rubber by the usual ingredients is difficult to bring about; for instance, as Twiss has pointed out[2], the incorporation of carbon black dispersions with latex yield comparatively crude admixtures; although the mixed particles are of microscopic or ultra-microscopic size, they are still too large to manifest reenforcement, such as occurs for instance in normal mill mixings.

From a practical standpoint, therefore, it is necessary to consider how to obtain ultra-microscopic bonding, i.e., re-enforcement, but without breaking the form of the dispersions. For reenforcing latex rubber by appropriate ingredients it may be feasible to "open up" the rubber particles. For this purpose it is necessary to burst the particle by swelling the hydrocarbon interior by a suitable solvent, or, alternatively, so to dissolve the exterior (protein?) protective layer of the particles that the interior is readily freed and at once fuses with the neighboring particles of reenforcing agents when the dispersions are coagulated or otherwise broken. At present little is known of this condition or how it can be produced. Certainly by the mere admixture of rubber latex and a dispersion of a rubber solvent this result is not obtained. There is produced in this case a mixed dispersion in which the rubber particles and solvent globules are protected for the purposes of maintaining the dispersion, and therefore protected from one another. There may be combined with the dispersion of solvent a "destabilizer"[3] (or coagulant), for example, alcohol, which reduces the protection extant in the system and causes a close approach between the rubber particle and the solvent globule. Another method is to heat the mixed dispersions, which appears to have a similar effect.[4] Experimentally, however, it is very difficult to determine the exact degree of destabilization required, and the result often obtained is coagulation.

More promising results have been obtained by the use of certain drying oils. For example, a small proportion of linseed oil appears to confer the desired properties in some respects. The appearance of such latex may be described as "stringy," i.e., elastic, although under the microscope the diluted material shows the typical Brownian movement of the uncoagulated latex particles. Possibly a protein "dispergator"[5] would predispose the rubber particle to gentle attack by solvent globules, which effect is to be aimed at.

An allied problem is the softening of rubber films obtained directly from latex since dispersions of softeners yield only crude mixtures with latex, and it is not at present possible to duplicate the effect of mastication and to deposit from latex a masticated rubber. It has been observed that latex stored in iron containers for considerable periods, that is upward of 2 years or more, yields on drying down a rubber that is soft and plastic, resembling in all respects a masticated rubber. This indicates some specific action on the part of the container, or oxidation or "depolymerization" catalyzed by an iron or tin salt. Experiments in which ordinary rust scraped from old iron was incorporated with latex which was subsequently heated for short periods have given interesting products indicating pronounced softening. Short periods of storage at normal temperatures with iron oxides commonly used as pigments in rubber mixes have not given plastic rubbers, and it appears that long storage or raising the temperature is necessary. Care is necessary because most iron oxides also have a flocculating effect on latex, due to their content of calcium sulphate or other impurities. It is necessary therefore to employ pure Turkey red or other iron oxide or hydroxide which does not reduce the stability of the mixture. The use of iron derivatives for this purpose, however, is probably only one example of the general use of oxidation catalysts for plasticizing purposes.

It will be clear from the foregoing that practical applications of latex are confined to the preparation of either substantially "pure" rubber articles or those in which reenforcement in the true sense is not required. For bonding fibrous, micaceous, or abrasive materials latex is therefore very satisfactory. These applications may be conveniently divided into 2 groups, which, for brevity, may be described as fibrous or otherwise.

Among the fibrous and similar materials that are used in these preparations the following are the most important;

(*Continued on page* 35)

[1] *Bull. Rubber Growers' Assocn.*, Dec., 1932, pp. 682-87.
[2] *Trans. Inst. Rubber Ind.*, 6, 428 (1931).
[3] British Patent 372,775.
[4] British Patent 343,548, the thickening of "Latex-lubricants" by heat.
[5] P. P. von Weimarn, *Rep. Imp. Ind. Research Inst., Osaka, Japan*, 9, 1-50 (1928).

United States Rubber Co.

The Oldest Budded Trees in Sumatra

Bud Grafting Heveas

Producing Pure Strain Seed from Superior Trees

WHEN one examines the history of bud grafting Hevea, the striking fact emerges that in the 3 chief rubber planting centers the initiative was taken by practical planters. It was Bodde, of Pasir Waringin Estate, Java, who made the first successful attempts at budding Hevea; Gough, now of Prang Besar Estate, introduced the practice into Malaya; and Dias aroused interest in it in Ceylon. Whether, however, budding would have spread so rapidly in Java and, above all, Sumatra and have been so widely discussed as to attract the attention of Gough and Dias, if the scientific investigators, Cramer and van Helten, had not enthusiastically and systematically pushed Bodde's initial work, is problematical. It is, therefore, no disparagement of Bodde's pioneer work to point out that the first scientific and systematic tests in the selection and budding of Hevea were made in 1916 by Cramer, then of the Department of Agriculture, Java, in collaboration with van Helten.

By 1918 small areas had been budded on the Pasir Waringin and Bodjong Datar estates and the Cultuurtuin, Buitenzorg, all in Java, and also about the same time by the Holland-American Plantations Co. and the A.V.R.O.S. Experiment Station, in Sumatra. Most of the preliminary work had been completed in the Dutch colonies by the time the first buddings were made on Kajang estate in 1921 by Gough. The earliest experiments in Ceylon are of about the same date.

The total budded area in the Far East is roughly 500,000 acres, but a small percentage of the 7,000,000 acres estimated as the total area planted to rubber there. About 290,000 acres are in the Netherlands East Indies, and there chiefly in Sumatra; 137,974 acres are in Malaya, and about 50,000 acres in Indo-China. In Ceylon progress has been comparatively slow.

Budding of Hevea has been selected as the quickest method of propagating the superior yielding qualities of exceptional trees on a large scale. On practically every estate individual Heveas are found giving unusual yields, in some cases upward of 20 pounds of dry rubber per tree per annum. By grafting growing buds from such trees on to suitable stocks it is hoped eventually to develop plantations yielding over 1,000 pounds per acre, or 2 to 3 times the present average output. The procedure, however, is not so simple as it sounds. The progress that has been made so far has only been attained at the cost of much careful, patient, and persistent effort on the part of some planters and the experiment stations, largely working in close cooperation.

Before a tree is approved as a mother tree and bud grafts made, not only its yields but susceptibility to disease and general physical habits are carefully observed for some years. But only about 3% of mother trees are capable of transmitting their productivity to their offspring so that after years of careful work numbers of clones (a clone com-

prises the bud grafts from one mother tree) have to be rejected as poor yielders. An instance of what may occur is clone PR 45, of East Java, which averages only 1 gram of rubber per tree per tapping, whereas the mother tree averaged 64.1 grams of dry rubber over 6 years.

But even when a clone inherits the yield capacity of its parent, it may develop undesirable characteristics which place it in a lower category as material for further propagation, if it is not rejected altogether. It may show one or more of the following defects: a marked tendency to brown bast or other disease, poor bark renewal, unfavorable wintering habits, liability to wind damage, or latex below standard. Thus BD 2, one of the oldest Java clones, although a good yielder, is no longer specially recommended since it develops brown bast, and the quality of the latex is poor; various AV and PR clones, too, have now had to be relegated to second class for similar reasons. Again some clones react unfavorably to certain climatic conditions. Thus BD 5, of Java, one of the best proved clones and usually a very vigorous grower in other countries, has been found in Ceylon to be extremely susceptible to *Phytophthora* attack on green shoots.

Bud grafting, therefore, offers many problems, not to say risks; and planters and investigators are constantly at work to find ways to solve the first and minimize the latter. Clones have been carefully studied as to their reaction to different surroundings and treatment, and suitable clones can now be recommended for special conditions. Experiments in breeding disease resistant trees have been started, *Hevea Brasiliensis* in Java being combined with other varieties of Hevea, notably *Hevea spruceana*. Much experience has further been gained in the technique of budding, leading to more widespread budding in the field. Whereas in the early days stock of 9 months was usually selected for budding, it has been found that with care and skill young trees of 3 and even up to 5 years can be successfully budded. This point is of special significance as offering the quickest method of converting existing young areas of ordinary trees into up-to-date high yielding plantations.

Finally, tapping systems and the physiology of the latex flow are now receiving much attention, especially by the Dutch. Since there is close relation between tapping systems, incidence of bark disease, the consistency of latex, and the greater susceptibility to brown bast of high yielding trees compared to ordinary trees, the work is very important.

If despite all difficulties planters and investigators continue to carry on, it is because of the exceptional yields obtained from the best proved clones. Leaving out of consideration the newer clones, we find that the oldest clones, BD 5 and BD 10, in Java, averaged respectively almost 30 and 22 pounds per tree per annum in 1931 when they were 13½ years old. In the same year another Java clone, Tjir. 1, gave no less than 41 pounds 6 ounces per tree per annum at 11½ years, while Tjir. XVI at the same age gave 21 pounds 6 ounces. The best Sumatra clones, AV 49, 50, 152, and 256 in 1929 gave between 11½ and 17 pounds per tree per annum when they were 9 to 10 years old.

Excellent results are also shown by the Malaya clones; the best, PB 186, was budded in 1922 and gave over 27½ pounds per tree per annum in 1931, and 5 other PB clones of about the same age, from 12 to 21 pounds per tree per annum.

No adequate details regarding latest costs of planting buddings are available. About the end of 1928, when bud wood of approved clones was much scarcer than it is now, a meter of bud wood averaging about 15 buds sold at 1 to 20 guilders in Java, according to the record of the clone. The extra cost of planting 250 buds per hectare, with material costing 2 guilders per meter, was 38.83 guilders, including labor, transportation, packing, etc. Today guaranteed budwood from good AV and Tjir. clones is offered for sale in Java at 25 to 50 guilder cents per meter, and BD clones at 40 to 50 guilder cents per meter, packing charges not included. Since labor too has become much cheaper in the meantime, the additional cost of budding as compared with planting ordinary seedlings, according to the above rates, could not have been much over 12 guilders per hectare in 1932. (Guilder, 100 cents=$0.402 U. S. equivalent.)

These costs, however, do not provide for replacements that may have to be made. Young budded plants are much more susceptible to mildew and *Phytophthora* than are seedlings, and some estates, at any rate, must have considerable loss on this head. In addition to the initial extra costs are extra costs for fertilizers and disease control. Budded trees must be more carefully watched for symptoms of disease not only because they are more susceptible than ordinary trees, but also because of what they promise. But even so, the cost of budding cannot be considered too high if the aim in view, trebling yields and halving costs, is attained.

Budding, of course, is not an end in itself, but a means to an end: obtaining pure strain seed from superior trees. This result it is hoped to achieve by artificial cross-pollination and self-pollination of superior budded trees. Work in this direction has been progressing for some time both in the Dutch colonies and in Malaya, and already available are tappable trees obtained from artificial self-pollination which are reported to give better yields than those of even the best clones. Some of these trees in Java have in their turn been artificially self-pollinated so that there, at any rate, legitimate seed of the second generation should be available at present.

In many respects work in propagating high yielding trees has so far been successful. However mention should be made of reports that have from time to time revealed phenomena suggesting degeneration among certain clones. Such symptoms are, for instance, the large percentage of unsound seed from these clones, the adverse effect of mildew attacks on the germinating powers of seed from buddings (mildew does not impair the viability of seed from seedlings), the fact that bud wood from clones shows a much lower percentage of successes than does bud wood from mother trees, and the degeneration of pollen noticed in certain clones. Further experimentation and observation, of course, will determine what importance is to be attached to these phenomena.

Rubber Thread

(*Continued from page 27*)

the project should be accepted with some reserve. Nevertheless this has been achieved in latex thread by combining the natural properties associated with rubber articles made directly from latex with a careful choice of vulcanizing and other compounding ingredients. Reference has already been made in the literature to the ability of these fine threads to withstand laundering.[3]

Frequent tests have shown the resistance of latex thread to heat and light to be exceptionally good. Its initially high tensile properties constitute a reserve of strength which allows the thread to lose even half its tensile strength under severe conditions of aging and yet still to retain a breaking resistance comparable to that of an unaged cut thread.

[3] Davis, *Textile Manufacturer*, 57, 347 (1931).

Oenslager's Discovery[1]

Perkin Medalist Describes His Research on Organic Accelerators

George Oenslager

THE problem of improving the quality of articles made from extracted Pontianak rubber was assigned to me as research chemist in 1905. The reward in case of success was most alluring. If it were possible to manufacture first-quality goods from the 10-ton daily production of cheap rubber from Pontianak, there was a potential saving of around a dollar per pound of rubber, $2,000 a ton, or $20,000 a day.

The first question considered was: Does the extracted rubber have the same chemical composition as Fine Para? After freeing it from the 4% of organic dirt, 5% of mineral matter, and 5% of resinous material which it usually contained, the clean, transparent rubber, now of a pale yellow color, had practically the same proportions of carbon, oxygen, and hydrogen as Fine Para rubber. Thinking that possibly the mastication of the extracted Pontianak rubber could result in partial oxidation, which might be the cause of its inferior qualities after vulcanization, systematic analyses of the rubber were made before and after mastication. No important change in chemical composition was found.

It was now thought desirable to carry out a systematic study of the effect of adding a great variety of typical inorganic compounds to simple mixtures of rubber, zinc oxide, and sulphur, and to note the results of heating for varying periods of time at different temperatures. In other words endeavors were being made to find out whether or not there were catalysts of the reaction between rubber and sulphur other than white lead, litharge, lime, and magnesia, which had been in common use in the industry.

The first compounding and curing experiments were conducted with materials then available in the laboratory. A suitable formula was chosen closely approximating that commonly used in the manufacture of tire treads at that time, calling for 100 parts of Fine Para rubber, 62.5 parts of zinc oxide, and 6.25 parts of sulphur. Such a mixture develops its maximum tensile strength of about 2,800 pounds per square inch when vulcanized 90 minutes at 287° F. In this mixture the Fine Para was replaced with Corinto rubber, a Central American rubber which cured very slowly and had poor physical properties after vulcanization, and to it was added such materials as barium sulphide, zinc dust, aluminum powder, tin dust, lead powder, red phosphorus, antimony trisulphide, silver sulphide, mercuric sulphide, and many other materials. It was hoped that the added sulphides or, more probably, those formed in the rubber mixture by combination with sulphur under the conditions which obtained during vulcanization, would further react to form polysulphides and that these might be active catalysts or sulphur carriers. All these materials, and many others, were found to be of little or no value as catalysts of the reaction.

One material was found, however, which had remarkable properties—namely, mercuric iodide. When incorporated in small amounts into the standard rubber batch, it had a profound effect on the rate of cure; for example, a mixture containing 100 parts of Corinto rubber, 60 parts of zinc oxide, and 10 parts of sulphur would not give a good, technically cured product when heated for 2 hours at 291° F. The maximum tensile strength was only 1,200 pounds per square inch. When, however, 2.5% of mercuric iodide, based on the weight of the rubber, was added to the batch, a product having a maximum tensile strength of 2,600 pounds per square inch was obtained by vulcanization in the short time of 20 minutes. This substance was apparently a powerful catalyst for the rubber-sulphur reaction, and its effect on vulcanizing a number of the important grades of rubber was studied. The amount required to produce a definite degree of cure in a definite period of time at a definite temperature varied with the grade of the rubber, being smallest with the fast-curing and largest with the slow-curing rubbers. Even extracted Pontianak rubber (which gave a very poor, technically cured product in a mixture containing only rubber, zinc oxide, and sulphur) gave an excellent product upon the addition of a few per cent of mercuric iodide, closely approaching the highest grades of rubber in quality. After further experiments with mercurous and mercuric bromides and chlorides, mercuric iodide was found the most satisfactory material.

Here was a distinct step in advance. A substance had been found which, when added in small amount to any of the common rubbers, would cause them to cure at the same rate under identical conditions, and yield products having approximately the same physical properties in the vulcanized state. Also, it was found that, by decreasing the sulphur below the amount then in common use and increasing the amount of catalyst, the tensile strength could be greatly improved. Mercuric iodide, therefore, not only hastened vulcanization of slow-curing rubbers, but also imparted to them fine physical properties of high grade rubbers, which litharge, lime, and magnesia had failed to do.

These experiments showed that tremendous profit could be made if through the use of mercuric iodide the cheaper grades of rubber could be substituted for the more expensive varieties. The fact was not overlooked that mercuric iodide might act as a carrier for oxygen as well as for sulphur and consequently hasten the deterioration of the vulcanized product. However, lacking the laboratory aging tests, the company manufactured in April, 1906, a limited number of solid and pneumatic tires containing mercuric iodide and cheap grades of rubber to ascertain how they would perform in service. Because of overcure or, more probably, because oxidation was promoted by the mercuric iodide, many of these pneumatic tires failed badly in service.

[1]Abstract of the paper by George Oenslager, research chemist, The B. F. Goodrich Co., Akron, O., given in New York, N. Y., before a joint meeting of the American Section of the Society of Chemical Industry, the American Chemical Society, Société de Chemie Industrielle, and the Electrochemical Society on Jan. 6, 1933. From *Ind. Eng. Chem.*, Feb., 1933, pp. 232-37.

Nevertheless the results of the work with mercuric iodide were very encouraging because they demonstrated that at least one material had been found which, when used in small quantities, would produce the desired effect on vulcanization. It was obvious that the poisonous characteristics of mercuric iodide made its use an extremely undesirable industrial hazard and that something less injurious to workmen would have to be found. Therefore I turned my attention to organic compounds.

When one considers that materials such as lime, litharge, and magnesia, long used as catalysts or accelerators for the reaction between rubber and sulphur, are basic in character, it would seem natural to conclude that an organic base completely soluble in rubber might be a more satisfactory catalyst. Aniline, being one of the simplest, commonest, and cheapest of the organic bases, was the first which I investigated. This material was found to have marked value as an accelerator when used in the tread recipe to the extent of between 4 and 6% on the weight of the rubber. Since the basic properties of aniline are due to the amino radical, it was deemed necessary to determine the significance of the amino group of organic compounds in their action as catalysts of vulcanization.

Various nitrogenous bases were employed in the study. Toluidine and xylidine gave good results; naphthylamine in comparison gave poor results. Replacement of the hydrogen atoms of the amino groups with organic radicals seemed to decrease the catalytic action; dimethylaniline and diphenylamine were found to be only slightly active, if at all. If to the amino group was attached a carbonyl group, as in acetamide or acetanilide, the activity was greatly decreased. Materials such as phenylhydrazine containing an $—NHNH_2$ group, and hydrazobenzene, containing an $—NH \cdot NH—$ group, were inactive. Quinoline gave fair results; urea gave excellent results, as did also hexamethylenetetramine. It was observed that not all compounds containing nitrogen were useful as accelerators, but of those which had value, the activity appeared to be related to the presence of amino nitrogen.

At the same time the search for good catalysts included various other types of compounds. Typical materials such as naphthalene and anthracene, iodoform and phenyl iodide, mono- and dinitrobenzene, benzaldehyde, phenyl sulphocyanate, gallic acid, tannic acid, phenol, ethyl oxalate, azobenzene, phthalimide—all were tested and found lacking in desirable properties as accelerators of vulcanization. Tetraethyllead gave excellent results.

It was later discovered that compounds containing the nitroso group were active. Nitrosodimethylaniline, for example, was found to be exceedingly powerful, much more so than aniline. When mixed with various wild rubbers in the standard tread recipe to the extent of about 0.5%, it caused them to cure in about 15 minutes at 287° F., with the development of a maximum tensile strength of about 2,800 pounds per square inch. This appeared to be a remarkable accelerator, and careful consideration was given to its adoption. There was one serious objection: When used in a rubber batch, it stained yellow everything with which it came in contact. Hence this material was not considered commercially desirable.

Attention was again turned to aniline. It was cheap but toxic when inhaled or brought in contact with the skin. Could it not be combined with some other material to form a solid body low in toxicity which preferably would melt at the temperature of vulcanization to form a liquid soluble in the rubber? It was hoped that such a material might be even more effective as an accelerator than aniline itself.

The chemical having these desired properties was found to be thiocarbanilide, the reaction product of aniline with carbon disulphide. When it was mixed with various wild rubbers, zinc oxide, and sulphur, the rate of cure was greatly increased, and the physical properties, as evidenced by high tensile strength, were remarkably good. Even the extracted Pontianak rubber, which, when mixed with zinc oxide and sulphur, would not give under any condition of vulcanization a product having high commercial value, responded strikingly to this accelerator. For example, if 3% of thiocarbanilide was added to the standard tread batch, a maximum tensile strength of 2,500 pounds per square inch was developed on vulcanization for 60 minutes at 287° F. On doubling the amount of thiocarbanilide, the time of vulcanization was reduced to 10 minutes and a tensile strength of 3,000 pounds per square inch was developed. The tremendous decrease in time of cure which was effected by the use of this accelerator gave promise of great commercial value, but of equal importance were the improvement in physical properties of rubber so vulcanized and the more uniform behavior of various grades of rubber when cured with this accelerator.

It now became necessary to choose the best chemical for experiments on a commercial scale. Such a material should be reasonably cheap, nontoxic, either a liquid or a solid easily reduced to a fine powder, reasonably powerful as an accelerator, and easily manufactured by employes with but limited intelligence. Thiocarbanilide seemed at that time to meet these requirements, and accordingly a small plant was built for its manufacture. In September, 1906, this material and also aniline were employed experimentally in the manufacture of tires. Thiocarbanilide was used as the accelerator in the tread portion of the tire, and aniline was used in the rubber compound which was calendered on the fabric.

In view of the unfavorable experience in the use of mercuric iodide, careful attention was centered at this time on any tendency toward rapid perishing or aging resulting from the use of these 2 accelerators. Samples of vulcanized rubber containing varying amounts of accelerator and sulphur, cured for varying periods of time, were stored in the dark and were also exposed to the outside atmosphere for a period of nearly a year. Examinations were made periodically of the physical properties of these samples. At the same time sections of tires were stored away for aging tests and were periodically examined.

It became apparent that these 2 materials were not only accelerators of vulcanization, but also good preservatives of vulcanized rubber; in modern terms, they were fair antioxidants. In the latter part of 1907 aniline and thiocarbanilide were used in all the tires manufactured by The Diamond Rubber Co., as well as in the better grades of solid tires and mechanical goods. At that time my active interest in the discovery of new accelerators ceased, and henceforth I turned my attention to their manufacture and practical application.

The research work above described developed some surprising results. The original purpose was to find some ingredient which would impart to rubber goods made from the cheaper grades of rubber the superior wearing qualities then obtainable only from Fine Para. While this was being accomplished, it was discovered that these same ingredients imparted to compositions made from the best grades of rubber a 20% increase in tensile strength and a material reduction in the time of cure. Today, for example, some articles such as automobile inner tubes are being cured in as short a period as 7 minutes; passenger car tires which formerly required 3 hours now require only a one-hour cure.

Later, as a result of the growth and development of the plantation industry, the price advantage of the wild rubbers was reversed in favor of the plantation grades. There still remained, however, the technical advantage of improved

(Continued on page 35)

Preservation of Latex[1]

Joseph Rossman, Ph.D.

FRESH latex after being tapped from the rubber tree coagulates in a few hours. To keep the latex in its colloidal form it is therefore necessary to add some substance which will preserve it as an emulsion and prevent it from coagulating during shipment. A large number of compounds have been suggested in the literature[2] for this purpose, such as ammonia, formaldehyde, caustic soda, creosote, salicylic acid, borax, sodium oxalate, sodium fluoride, B-naphthol.

The use of ammonia, probably the best commercial preservative for latex, was suggested many years ago by Johnson in his English patent 467 of 1853, who added one fluid ounce of concentrated ammonia to every pound of latex, and by Norris in his United States patent 9,891 of 1853. Even earlier a French chemist, Fourcroy, discovered in 1791 that latex can be preserved by adding alkali.

In general materials that are used for preserving latex fall into one of the following classes: those that have definite anti-coagulating properties; those with definite antiseptic or germicidal properties; and those with combined properties of preventing coagulation and putrefaction, one of the 2 properties being predominant. Ammonia and formaldehyde are best known; the former belongs to the first named class, but also retards putrefaction under certain conditions; and the latter preserves without much increased stability and requires careful procedure to prevent coagulation.

In compounding latex it is quite common to add a stabilizer or a preservative to the latex to prevent coagulation. Many substances have been used for this purpose.[3] The following are abstracts of United States patents dealing solely with the preservation of latex.[4]

1. Bronner, 9,246, Sept. 7, 1852. The patent states that 20 pounds of "campeche salt or muriate of soda" are mixed with each barrel of latex to keep it from fermenting and to preserve it during transportation. Muriate of soda is an obsolete term for sodium chloride.

2. Norris, 9,891, July 26, 1853. This is the first patent issued in this country for ammonia as a preservative for latex. Because of its interest the following is quoted:

"The milk or juice from the caoutchouc or india-rubber tree is collected by tapping the trees and allowing it to flow into vessels of clay or other material. Then and before the milk or juice is soured—say within 3 hours after it is drawn from the tree—it should be strained through a clean cloth or other strainer into a clean vessel—say of tin or glass. This being done, I add to the milk or juice the concentrated liquor of ammonia, or ammonia in any other form, or its equivalents which will produce a like result; but I prefer the concentrated liquor of ammonia, as I have found that by experience to be the best.

"The proportions may be varied, but those which from experience I have found to be the best, are to every pound of the milk or juice add one fluid ounce of the concentrated liquor of ammonia. I then agitate the composition so as to thoroughly mix the ingredients together. The composition so formed will be in a liquid state, remaining as white as when drawn from the trees. It can then be put up in air-tight vessels for transportation or future use, and for this purpose I prefer tin cans or glass bottles, as being of a cheap material and convenient form. The composition so made and inclosed may be transported to any part of the world and still remain in a state of preservation; and although I have spent about 10 years in experimenting to invent or discover some means of compounding and preserving in a liquid state the milk or juice from the caoutchouc or india-ruber tree, or to make a composition with it which could be preserved so as to be transported to remote places without deterioration, and which experiments have involved the use of various kinds of air-tight vessels, and the mechanical admixture with the milk or juice of various substances, yet I was never able to succeed prior to my making the discovery as above described."

3. Morisse, 853,718, May 14, 1907. Phenol or formaldehyde is added to latex. The following precautions are given for tapping the latex:

"The bark of the trees from which the milk is to run is scraped and the points traversed by the latex coated with an aqueous solution rendered slightly alkaline. The milk is received beneath the incisions, after traversing the smallest possible path, in receptacles of any appropriate kind containing an alkaline solution; 10 volumes of this solution to the hundred for 60 grams of milk appear to give the best results." Three grams of ammonia per 100 grams latex are also added.

4. Davidson, 1,145,352, July 6, 1915. "Alkalized creo-carbolic" is aded to latex prepared from one part of creosote or a mixture of creosote and carbolic acid and 2 or more parts of an aqueous solution of caustic soda or caustic potash of a strength of 50° Twaddell. If formaldehyde is added, it may be employed in a proportion of one part of formaldehyde of 40% strength to each 4 or more parts of alkalized creosote or phenoloid. One part of this mixture in 20 parts of water is added to the latex.

5. Davidson, 1,146,851, July 20, 1915. The following prepared solutions are added to latex. Example 1: Mix with 108 parts of cresylic acid or 120 parts of higher tar acids a solution of 40 parts of caustic soda or 56 parts of caustic potash in 120 parts of water. This forms an aqueous solution to which any further quantity of water can be added without precipitating the cresylic or higher tar acids.

Example 2: To each 100 parts of the mixture of alkalized cresol, as described in Example 1, add 1 part (or more) of liver of sulphur dissolved in about 15 parts of water to each 1 part of liver of sulphur, or an aqueous solution of any other polysulphide or sulphide of potash or soda having an equivalent amount of sulphur in it to that contained in the solution of liver of sulphur as above described and employed.

Example 3: To each 100 parts of the mixture of alkalized cresol, as described in Examples 1 or 2, add 5 or more parts by weight of 20% to 40% formaldehyde solution. In practical use add and stir into the latex a suitable proportion, from 1 to 5%, of any of the above referred to

---

[1] Received from author May 26, 1932.

[2] See Bedford and Winkelmann, "Systematic Survey of Rubber," Chemical Catalog, 1923, pp. 302-305; E. A. Hauser, "Latex," 1930, pp. 100-105.

[3] See J. Rossman, "Compounding Latex," INDIA RUBBER WORLD, May, 1932, and subsequent issues.

[4] For a review of recent foreign patents see R. Ditmar, "Stabilization du Latex de Caoutchouc," *Caoutchouc & gutta-percha*, Oct., 1931, pp. 15732-33; Aladin, "Latex, Konservierung und Koncentration," *Gummi-Ztg.*, 43, 1047-49, 1105-106 (1929).

3 examples of the undiluted alkalized cresol mixtures. The proportions in which the preparations are added to the latex may vary according to requirements and to the character of the latex, which, as is known, varies considerably with the locality from which it comes, the season of tapping, etc.

6. Zertuche, 1,302,266, Apr. 29, 1919. The juice of the gobernadora, the common mesquite plant (Ramille de mesquite), the holm-oak, or cascalote is added to latex. The crushed branches or leaves of these plants are steeped in hot water, and the juices strained off.

7. Davidson, 1,447,930, Mar. 6, 1923. The invention consists in preparing an alkalized phenol preservative in a solid and concentrated form which can be conveniently and cheaply transported to the rubber growing estates packed in wooden boxes, lead-lined, similarly, for example to the lead-lined chests in which tea is transported to the market from the tea growing estates. The preservative is made by mixing 2 parts by weight of phenol crystals with 1 part by weight of caustic soda in solid form. These ingredients are ground together in a warmed receptacle for a few minutes during which time the mixture, under the influence of the intimate contact thus brought about, becomes semi-fluid, but gradually assumes the condition of a fine white powder. This powder can then be pressed into solid blocks of any suitable size or shape, and so long as these blocks are not freely exposed to atmospheric action they will remain in their original shape and condition for an indefinite length of time. In use the blocks are dissolved in water to constitute an aqueous solution of about 3 to 5% strength prior to the addition to the latex.

8. Rutherford, 1,619,938, Mar. 8, 1927. Latex is preserved with an organic antiseptic and trisodium phosphate. While formaldehyde is preferred as the antiseptic or bactericide, other substances can be used such as phenol, cresol, resorcinol, and hexyl resorcinol. The quantities required of antiseptic and base will vary according to the length of time desired to preserve the latex and because of other conditions. For instance, latex collected during rainy weather and diluted with rain water shows a greater tendency to coagulate; the reason is not exactly clear, but may be due to tannin washed into it from the trees, and in such case a relatively greater amount of antiseptic and base are required. As one example of the process, where the latex is to be converted promptly into crude rubber, it may be preserved for short periods of time with relatively small quantities of the antiseptic and base, for instance approximately 0.1% formaldehyde and 0.0042% of trisodium phosphate.

In some instances it may be desired to keep the latex for a longer period before converting it into crude rubber or otherwise employing it, and for an interval of about 2 weeks the proportions used may be approximately 0.2% formaldehyde and 0.2% trisodium phosphate. If latex is to be kept for long periods, as for instance in shipping to other countries, the quantities must be correspondingly increased, and in such case approximately 0.5% formaldehyde and 1.5% trisodium phosphate may be used. One of the disadvantages of the use of formaldehyde as a preservative is that the commercial formaldehyde generally contains free formic acid, and the grade ordinarily used has been found to contain sufficient free acid to render a 10% formaldehyde solution 0.01% normal acid. This free acid, of course, tends to cause coagulation or thickening, but by the use of the above process this tendency is corrected, as the free formic acid is neutralized.

9. Gibbons, 1,673,672, June 12, 1928. The process described for treating latex consists in adding a material which prevents coagulation, but permits bacterial action, allowing the latex to stand until the protein constituents of the latex are substantially decomposed, then adding an acid and a material to prevent further bacterial action. Rubber obtained from such latex is white or translucent. The digesting materials used are pepsin, trypsin or papain, one or another of these digesting materials being used, depending upon whether the latex is alkaline or acid. Immediately after collection latex is acid unless an alkali, such as ammonia, for instance, is added at the time of collection. Decomposition may also be effected by introducing small quantities of fecal mater, putrid latex, or simply by permitting the latex naturally to decompose, as will result if it is left without preservative for any considerable time.

Example 1: In the usual rubber plantation practice the latex collections of the large number of coolies employed are bulked together in a collecting tank within a short time of collection from the trees. Preferably a solution of material which will stabilize the latex against coagulation resulting from changes in the latex, including those brought about by the bacteria present, is first placed into the collecting tank, and the latex added to this solution, which may be one of various materials, such as potassium or sodium salt of sulphonated undecylenic acid, the resultant product of naphthalene and isopropyl alcohol when treated with sulphuric acid, or generally any material which decreases the interfacial tension on the acid side. In practice a 10% solution of the sodium salt of sulphonated undecylenic acid is placed into the collecting tank; the amount of the acid is about 5% on the rubber content of the latex.

Latex does not coagulate of itself although the decomposition of the protein matters takes place. In practice the latex is left for 48 hours, at which time it is believed that practically complete decomposition of the proteins has occurred although in some instances the latex has been left as long as 5 days to permit decomposition of the proteins. At the end of this period the latex shows a pH of from 4.5 to 5. This latex may then be subjected to a spray desiccation process to produce the crude rubber, substantially according to the invention of patent No. 1,423,525, July 25, 1922. The result is a light colored translucent rubber.

Example 2: In this example the latex is allowed to decompose as in Example 1, but at an appropriate stage of the decomposition period an antiseptic is added. For instance after the proteins of the latex have decomposed from one to 5 or 6 days, 0.3% of formaldehyde, computed on the latex, is added thereto, preferably in the form of a 38% solution. Within an hour of the addition of formaldehyde all putrid odor has disappeared, and the latex is stable as against coagulation either by mechanical or bacterial action. This latex may be sprayed or subjected to any evaporation treatment whereby practically all, or a portion, of the water is eliminated. In the spray process the liquid contents are usually evaporated to a point at which the resulting crude rubber shows a moisture content of under 1%, but it will be understood that the latex may be subjected to an evaporation process whereby it is concentrated without producing coagulation, and such concentration may be carried to a very high degree. The dry rubber resulting from this latex is acid, and although not so light as the rubber produced by Example 1, is much softer to break down on the mills.

Example 3: There is associated with the latex having a rubber content of around 35%, about 0.75 of 1% (on the rubber content) of the sodium salt of sulphonated undecylenic acid in the form of a 10% solution. This latex is then allowed to decompose, and 0.3% (on the latex) of formaldehyde is added, and then 0.5 to 2% (on the rubber content) of phosphoric acid, or 1 to 2% (on the rubber content) of picric acid is added, so that the degree of acidity will be increased for the purpose of producing a tacky, soft rubber, easy to break down and having good milling and calendering properties, and at the same time producing a marked improvement in the physical characteristics of the vulcanized product, particularly in withstanding flexing when used as the layer of rubber between the fabric plies of a tire.

Example 4: Latex is treated as in Example 3, except that in substitution for, or in addition to, the acid employed in Example 3, up to 5% of cresol is added to the latex.

Example 5: Instead of effecting or permitting decomposition of the protein constituents in the latex, the mechanical stabilizer referred to in the foregoing example may be associated with the latex at the collecting station, and the formaldehyde or other antiseptic may be added at the same time, together with the acids—phosphoric, picric, acetic—and/or cresol, and the resulting latex concentrated by an evaporation method so as to produce an uncoagulated latex which may be later diluted; or the latex may be subjected to the spray desiccation process referred to above, or to any other method for the production of crude rubber, whereby substantially all the non-rubber constituents are retained.

10. McGavack, 1,699,368, Jan. 15, 1929. This patent describes a method of preparing a stable acid latex. As one illustration of the invention, 1,000 cc. of natural latex are treated with 3 to 5 grams of the reaction product of cinnamic acid, butyl alcohol, and sulphuric acid or chlorsulphonic acid. To the latex is also added 10 to 15 cc. of 38% formaldehyde solution. This latex is stable and has an acid reaction.

When treating ammonia preserved latex instead of natural untreated latex, it is necessary to remove the ammonia or nullify its effect. This may be accomplished by air blowing, by neutralizing, by precipitating the hydroxyl ions as insoluble hydroxides, formation of complex compounds with the ammonia or in any other suitable method. Prior to the disposal of the ammonia, or simultaneously therewith, 5 to 10 grams of the reaction product of para cresol and oleic acid obtained in the presence of sulphuric or chlorsulphonic acid are added per thousand ccs. of 38% latex. After the addition the ammonia may be removed by an air blowing treatment. After this removal has been completed the latex is then treated with about 40 cc. of 38% formaldehyde. The product is a suitable latex having an acid reaction, that is its pH may vary between 4.5 and 7, depending upon the amount of formaldehyde added.

Instead of blowing as a method of removing the ammonia, the latter may be neutralized with a weak acid such as acetic acid or boric acid, and the addition of the acid continued until the proper hydrogen ion concentration has been reached or is increased above 1×10^{-7}. In this instance an appreciable quantity of salts will be formed as a result of the reaction of the acid and the ammonia, and care must be taken to have a sufficient amount of the stabilizer agent present when the acid is introduced. Otherwise the salts formed will ionize and tend to disturb the latex equilibrium. In cases of salt formation, and the presence of salts in the latex constitutes no disadvantage in any subsequent use of the latex, the neutralizing treatment is quite satisfactory. Where, however, it is not desirable to have inorganic salts thus formed, formaldehyde may be added to the ammonia latex instead of the acetic acid or other acid. In this instance the amount of formaldehyde should be sufficient to react with the ammonia and to give the desired hydrogen ion concentration. By this method the latex may be brought to a very strong acid concentration, or at least to a point as low as pH 4.5. To illustrate more specifically, 1,000 cc. of ammonia preserved latex containing 36% of rubber are treated with 8 grams of the reaction product obtained from the condensation of butyl alcohol with cinnamic acid in the presence of sulphuric acid. To the latex are added 30 to 35 cc. of 36% formaldehyde solution. It is believed that the ammonia reacts with part of the formaldehyde to form hexamethylene tetramine. A portion of the formaldehyde may react with the proteins in the latex to dispose of the free amino groups by adding them together in a methylene linkage structure, thus freeing the carboxyl groups of the proteins. (*To be concluded*)

Latex as a Bonding Agent

(*Continued from page 28*)

several of these materials are obtainable in 2 or 3 qualities, grades, and prices, although most are cheap, as for example fibers of leather, asbestos, jute, wood (pulp and flour), cotton, paper, granulated or powdered cork, glass wool, mineral wool, and kapok. From these are obtainable patented products, including several types of boards and papers, artificial leathers, such as are used in the manufacture of toe puffs,[6] and shoe bottom fillers[7]; also fluid latex compositions for home repair of shoe soles.

Latex bonded non-fibrous products are represented by the following examples. Latex for bonding grinding wheels is first compounded to be ultimately vulcanizable to an ebonite condition. It is then flocculated and mixed with the abrasive material, then is dried, shaped, and vulcanized.

Another latex application suppresses dust by bonding the fine particles of light gravity compounding materials. Latex treated with casein or other protective colloids is added to the dusty powder and binds its particles with a small amount of rubber. Artificial dispersions of masticated rubber can also be used for this purpose.

Several methods have been patented for making latex bonded pavements and molded articles from ground vulcanized soft rubber waste.

[6] British Patent 318,289.
[7] British Patent 343,977.

Oenslager's Discovery

(*Continued from page 32*)

physical properties and shorter periods of cure which resulted from the use of organic accelerators in rubber products.

The use of aniline and of thiocarbanilide, both in the plant of The Diamond Rubber Co. and of The B. F. Goodrich Co., following their merger in 1912, continued for some 10 years. Aniline was found especially desirable in the rubber compounds used for impregnating the fabric portion of pneumatic tires, because it made the uncured rubber soft and tacky, enabling it to penetrate thoroughly the meshes of the square woven fabric used in those days. In 1912 The Diamond Rubber Co. largely replaced aniline with *p*-aminodimethylaniline, after its superior qualities as an accelerator had been discovered by David Spence. Later thiocarbanilide came to be used extensively throughout the industry in the manufacture of mechanical goods, solid tires, and the treads of pneumatic tires. Although superseded by better accelerators, it is still used in small amounts.

It will be appreciated that the early work here described was only the beginning of a great development in the use of organic accelerators. Since that time several hundred have been brought to light by many workers in various places, and many of these are of special value in attaining specific results in the production of rubber goods. It is significant that most of these modern accelerators are derived from aniline.

Several large manufacturers of organic chemicals, realizing the importance of accelerators of vulcanization and of antioxidants, engaged in their manufacture—a business now amounting to about 5,000 tons per annum, and worth about $5,000,000. In the interests of progress they too found it necessary to establish laboratories for the development of materials having specialized properties. These are now being sold to the trade with full information as to their advantageous use.

Chlorinated Rubber

THE earliest observations on rubber and chlorine were made at the end of the eighteenth century by the well-known French savant, Antoine Francois Fourcroy, who used chlorine water as a coagulant.[1] In 1932, Ludersdorff noted that rubber resisted various gases, among others chlorine gas, and suggested that rubber could be used to store these gases. Berzelius also praised the resistance of rubber to the action of chlorine.[2]

However the first tests in actually allowing chlorine to act directly on rubber appear to have been made by Heinrich Traun, says Eck. Heinrich Traun, of the former Harburger Gummi-Kamm Co., founded in 1856, appears to have been one of the first rubber men to realize the importance of chemical research for the rubber industry. In 1859 he published a dissertation in which he stated that by allowing chlorine to act on rubber dissolved in bisulphide of carbon, after adding water, he obtained a perfectly white body which no longer resembled rubber, but was neither elastic nor flexible. Similar results were obtained when sulphurous acid was introduced. Eck points out that Ramondt[3] makes these claims for Roxburgh (1801) but that nothing of the kind is mentioned in the source quoted by Ramondt.

In 1865 Hurtzig produced substitutes for horn, ivory, ebony, etc., by introducing chlorine into solutions of rubber or gutta percha in chloroform, bisulphide of carbon, or benzol, washing the resultant pale yellow dough with alcohol and adding fillers.

Traun's process of chlorinating rubber is also mentioned by Otto Dammer in 1876. The experiments with chlorine, bromine, and iodine by Gladstone and Hibbert, which are constantly being referred to in recent literature, were not published until 1888.

Description of Apparatus

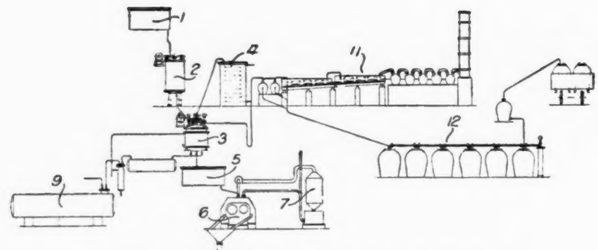
The schematic arrangement of apparatus for the manufacture of chlorinated rubber known as tornesit is shown in the illustration.[4] A distinguishing feature of this process is that the rubber solution is heated to about 80° C. (176° F.) or higher before treatment with chlorine. A stable product is thus obtained.

The apparatus comprises a vessel having stirring means for making a solution of rubber in carbon tetrachloride; a heating vessel with a stirrer wherein chlorine under pressure is mixed with the rubber solution. Means also are provided for recovering the hydrochloric acid formed and for recovering the solvent from the chlorinated rubber.

Chlorinating Rubber

The process as conducted in this apparatus takes place in the following sequence.

Solvent in vessel *1* is run into container *2* and stirred with disintegrated rubber to produce a 5% solution. The solution passes into a heated vessel *3* which is fitted with a cock for drawing off samples, and an inspection window. The hydrochloric acid generated, with vapor of the solvent and excess chlorine, passes to a condenser *4*, from which the liquefied solvent and absorbed chlorine is returned to the vessel *3*; while the acid passes to an absorption apparatus *11* and the storage system *12*. The chlorinated rubber is drawn off into a vessel *5* and is fed thence to a drier *6*, which may be heated and worked under reduced pressure. The evaporated solvent is led to a condenser *7*. If desired, the chlorinated rubber may be precipitated from solution by benzine.



Apparatus for Making Chlorinated Rubber

Application in Paints

The following is condensed from a recent report.[5]

The application of chlorinated rubber as a paint or lacquer is more or less in an experimental stage, and there is not sufficient experience available to indicate the most suitable paint or lacquer for any particular purpose. Paints containing this product are highly resistant to lyes and acids. For example it is possible to make a paint resistant to sulphurous acid, an acid which affects almost every binder known. The film obtained is entirely waterproof and does not swell in water so that the underlying surfaces are perfectly sealed. It will therefore be possible to protect iron constructions and ships from the influence of water by treating them with paints made of this chlorinated product.

Distinctive Qualities

As the decomposition of such paints begins at 135° C., they are not proof against high temperatures. Boiling heat can, however, be easily resisted. It is evident that the paints cannot afford protection against liquids in which tornesit dissolves, such as the benzene hydrocarbons, acetone, aniline, fatty acids, etc. Apart from their great resistance these paints have the advantage of quick drying. The rate of drying varies from 30 minutes to some hours according to the composition and can be completely adapted to the requirements of the consumer.

Similarity to Cellulose Lacquers

Tornesit paints can be applied for all purposes for which at present nitro-cellulose lacquers are used. Like cellulose lacquers, they are harder than oil lacquers, but this greater hardness is not obtained at the cost of the elasticity of the paint film. Tornesit paints also distinguish themselves favorably from nitro-cellulose lacquers in that they are more resistant to sunlight, which, as is known, has a detrimental effect on nitro-cellulose. In contrast to nitro-cellulose lacquers they are non-inflammable; which point may be of great importance under certain conditions. No difficulties are encountered when the paints are applied in a moist atmosphere; neither blushing nor a separation of the constituent parts occur. By the addition of drying oil, lacquers can be prepared surpassing the usual oil-copal lacquers in durability and hardness. The paints and lacquers may be obtained of any color.

---

[1] L. Eck, *Gummi-Ztg.*, Feb. 17, 1933, pp. 517-18.
[2] "Lehrbuch der Chemie" (1839).
[3] "History of Rubber Research" (1907).
[4] British patent No. 378,272.
[5] "Chlorinated Rubber and Its Uses." J. G. Fol and A. B. Bijl, *Bull. Rubber Growers' Assoc.*, Apr., 1932, pp. 210-19.

Now Is the Time for Action

OUR President has ably pointed the way for business men of the country. His quick decisive action in regard to the banking situation, in regard to governmental expense, and in regard to the manufacture of beer has met with public acclaim. As this is being written, we know that forthwith there will be legislation to help the agricultural section of our country and unemployment in general.

So to speak, he has started the ball rolling toward recovery. It now rests with the business men of America to further this movement as no return to normalcy is possible without the wholehearted cooperation of our business leaders.

For the past several years manufacturers in general, as well as manufacturers in the specific field of this publication, have tried to keep up their volume through continual cutting of prices. To be sure, certain of these cuts have been justified, but the large majority have not been deserved. It has simply been a case of under-selling to get what business remained.

While it is a matter of conjecture as to how much more volume might have been reduced if prices had been maintained, it is obvious that the cutting of prices has neither arrested the decline of volume nor placed companies in a profitable operating position.

Without going into a discussion as to what was or what was not gained by price cutting, we know that it did not bring back volume, profit, or wages. We also know that with the reduction in dividends, employment, and wages the purchasing power of the country has been cut down. It is evident that this continual reduction is self-destructive.

Through the legislation which has been passed by Congress and through the legislation which is now in discussion in Congress our Government is trying to give the country a fresh start. It now lies with the manufacturer to take advantage of this "new deal" if we are to see a return to prosperity. It lies with the manufacturer to stop price cutting, to stabilize the market at its present level, and then to raise prices.

We have heard the cry that a little more volume on present levels will put many companies back in a good operating position, but if prices are cut, then buying power is reduced and the looked-for volume cannot be realized. To hope that increased business in other fields will gradually reflect and give increased business in your particular field is exactly the same expectation as that of the other fellow.

Each is waiting for the other. Now is the time we must start the ball rolling through concentrated cooperative action of manufacturers at large to stabilize and then increase prices. It's the only road to prosperity.

EDWARD LYMAN BILL,
Publisher

EDITORIALS

Professional Invention

INVENTORS are popularly considered persons of unusual natural gifts for experiment and discovery. Charles Goodyear was an outstanding inventor of this tradition. His discovery of vulcanization was accepted as the result of fortunate accidental circumstances, and it became the basis of the great rubber industry.

Many minor inventions have since stimulated the progress of rubber technology but its later development is attributable chiefly to invention prosecuted along scientific and engineering lines in research laboratories. In other words, the approach to discovery and invention is through experimental science. Thus the engineer and chemist are in some degree potentially professional inventors.

The names of Edison, Tesla, and Elihu Thomson at once occur as leaders in the invention profession in the electrical field of a generation ago. Their successes are being followed by many important new inventions from the research laboratories established in every important industry.

In rubber the advance of its technology, the multiplication of its uses, and its acceptance as an engineering material of major importance are due chiefly to research conducted for decades in rubber plant laboratories.

Among the notable achievements of professional invention in rubber are the introduction of accelerators of vulcanization, age resisters, reenforcement of physical properties, aging tests, and automobile tire development. The industrial possibilities of latex applications now in progress offers a new field of rubber research already found fruitful for professional invention.

He Named India Rubber

TO GIVE to the basic commodity of the rubber industry a name that has endured for more than 150 years is indeed a noteworthy feat. India rubber had several designations before Dr. Priestley, using a piece of gum for erasing pencil marks, called it india rubber. And who was this man?

Joseph Priestley, LL.D., F.R.S., a chemist, was born in Fieldhead near Leeds, Yorkshire, England, in 1733, just 200 years ago. He became a profound theological and scientific student and delved deeply into chemistry, optics, and electricity. He is best known as the discoverer of oxygen; he also produced carbonic acid gas, thus laying the foundation of the soda water industry, and modern anaesthesia owes its existence to his discovery of nitrous oxide.

Dr. Priestley's opposition to the established church and his sympathy with the French revolutionists aroused ill feeling against him, and he was mobbed in Birmingham, which now honors him with a marble statue in front of its town hall. In 1794 he went to live with his sons in Northumberland, Pa., where he died in 1804.

When Volume Is Justified

IN COMPARING the manufacturing business records of the past few years wonder may be expressed why those with greatly increased volume should have a lower average of profit than the years when volume was much less. Increased volume generally means proportionally better profit. Perhaps the answer will be found in the fact that volume-getting has proved too costly in many manufacturing lines; in other words that the expense of distributing a volume in excess of consumer demand has been nearing the uneconomic state where cost per sale has been reducing profit to the vanishing point. While many manufacturing costs have been remarkably reduced, often the economies gained in that direction have been dissipated through wasteful high pressure selling, the correlative of high volume production.

Several large industrial concerns are said to have been so flagrantly at fault in this way as to deserve much of the blame for the present business condition. Obsessed with an unreasoning determination to outstrip all rivals in unit production, they taxed all their resources to the utmost, contented themselves with meager profits, deferred dividends, and so overtaxed distributers that finally the system broke down, and their last state was worse than their first. Even their hope of high volume compensating for the narrowing profit per unit availed nothing.

Many rubber manufacturers early learned that it was a mistake unduly to stress high volume and have since profited by pursuing a more conservative course. They distinguish between real enterprise and impressive activity and are not disposed to dally with danger, to flout sound commercial principles, or to try to break down consumer resistance at any cost. It is not worth the risk and effort. After all, the one important thing about volume is not how big it is but how profitable. Capital investment may reach huge figures and output be immense, but if the ratio of net returns be smaller than that of a less pretentious concern, how vain seems pride in mere volume!

What the Rubber Chemists Are Doing

A. C. S. Rubber Division Meetings

Annual Meeting

THE Eighty-fifth Meeting of the American Chemical Society was held in Washington, D. C., March 26 to 31, 1933. The sessions of the Division of Rubber Chemistry were held in the ballroom of the Raleigh Hotel on the mornings of Tuesday and Wednesday, March 28 and 29. L. B. Sebrell, chairman, presided. A business meeting of the division was scheduled as the last item of the Wednesday program. The Rubber Division and the Division of Paint and Varnish Chemistry held a divisional dinner jointly in the ballroom of the Mayflower Hotel on Tuesday night.

Abstracts of the Rubber Division papers follow.

Low Sulphur Compounding. Since the beginning of the rubber industry the sulphur dosages used for soft rubber have declined from 20% to 2 or 3% customary today. The decline is still under way, and present sulphur ratios may be considered high in comparison with what is actually required to produce satisfactory commercial vulcanization, viz., fractions of 1%.

Vulcanization with extremely low sulphur ratios, the use of selenium and tellurium as auxiliary vulcanizing materials and the proper type of accelerator required to "cure in" all the sulphur and produce satisfactory commercial results are discussed. Comparative data, covering a large number of physical attributes, are shown for pure gum and gas black stocks compounded with 3% of sulphur on the one hand and 0.3% and 1% (in the gas black stock) on the other.

The advantages of very low sulphur compounds are shown to be less tendency to scorch, better physical properties, better aging, higher resilience and lower power losses, less discoloration, greater resistance to hot solvents, greater abrasion resistance, and less flexcracking on aging; the disadvantages are higher set at low temperatures and reduced capacity to adhere to metals. It would seem probable that in the future compounding will be based largely on the use of very low sulphur ratios. A. A. Somerville and W. F. Russell.

Reactions during Vulcanization. III. The Multiple-Accelerator Effect. The mechanism of acceleration with a mixture of diphenylguanidine and mercaptobenzothiazole is influenced by the presence of fatty acids in the rubber compound. With an addition of a normal amount of fatty acid to the stock, the fatty acid solubilizes zinc oxide needed for activation, while the diphenylguanidine and mercaptobenzothiazole function as a mixed accelerator. When there is a deficiency of fatty acids in the stock, however, diphenylguanidine reacts directly with zinc oxide and then becomes an activator for the accelerator, mercaptobenzothiazole. A mixture of butyraldehyde aniline and mercaptobenzothiazole is influenced by fatty acids in the same manner as diphenylguanidine and mercaptobenzothiazole.

Experiments with the rubber compounding ingredients in a benzene-methanol medium are in agreement with the observations noted for the rubber stocks. In the presence of hydrogen sulphide, which is essential for the accelerator reactions, increments of diphenylguanidine increase the amount of soluble zinc available for activation of mercaptobenzothiazole, while additions of mercaptobenzothiazole to a fixed amount of diphenylguanidine do not influence the soluble zinc content.

Within the limits investigated, the amount of soluble zinc available for reaction has a direct bearing on the ultimate tensile strength of diphenylguanidine and mercaptobenzothiazole stocks. H. C. Jones.

Mechanism of the Aging of Rubber. The investigation attempts to follow the phenomena of aging in rubber by X-ray spectrographs, and to correlate the results with those hitherto obtained, especially solubility determinations. It has been found that the position of the characteristic lines in the spectrographs does not change after artificial aging, but the intensities do change. Charts have been prepared of the rate of depolymerization with aging. Comparison of rubber without antioxidant with rubber containing phenyl-beta-naphthylamine shows this type of antioxidant does not appreciably affect the rate of depolymerization. Bernard L. Johnson and Frank K. Cameron.

Variability of Rubber from a Plantation Viewpoint. This paper sets forth some of the causes of variation in plantation smoked sheets and points out how these variations may be overcome. The vulcanization tests are made using mercaptobenzothiazole, and comparisons are made with results obtained in the rubber-sulphur mix used by previous investigators. George A. Sackett.

Method for the Microscopic Examination of Rubber and Other Solid Technical Products. A method for preparing sections for microscopic examination is described. The method is of general application to raw materials and semi-finished or finished products of the rubber industry and is of especial value for preparing sections of composite materials, the constituents of which differ widely in hardness. The samples are hardened by curing and impregnation with molten sulphur and are then polished by variations of the usual metallographic methods and examined by reflected light. An application of the method to the quantitative estimation of the degree of dispersion of pigments in rubber stocks is outlined. Illustrations show some applications of the method of examination to a variety of products. Frank H. Roninger, Jr.

T-50 Test for State of Cure. In tires, machine supports, conveyer belts, hose, waterproof clothing, footwear, and other rubber articles the state of vulcanization of the rubber in the rubber compound is important for best results in service.

A simple, rapid, accurate physical test for the state of cure is described. The test depends upon the observation that for a specific rubber compound the greater the state of cure the lower is the temperature at which chilled stretched rubber will spontaneously retract.

The first step in the T-50 test consists of stretching a piece of rubber, chilling to a low temperature while stretched, and releasing. The rubber remains elongated: in other words, it is "racked." The next step consists of gradually heating the rubber and observing the temperature at which the rubber has retracted to such an extent that it has lost one half its original elongation. In many compounds most of the retraction occurs in a fairly small temperature range. The rate of contraction with increased temperature is usually greatest when the rubber has lost 50% of its elongation. The expression, T-50, means the temperature at which the rubber has lost 50% of its elongation.

The T-50 value for raw rubber is approximately + 18°C. (64.4°F.), and it decreases as the extent of cure increases. Roughly, every decrease of 13°C. (23.4°F.) of the T-50 value represents an increase of 1% of combined sulphur. W. A. Gibbons, R. H. Gerke, and H. C. Tingey.

Dispersibility of Gas Black. I. Methods of Measuring Gas Black Dispersion.

Previous investigators have used the nature of the surface, the appearance of micro sections, and various physical properties of the stock as a measure of the degree of dispersion of gas black in rubber. In this paper it has been shown that a close relation exists between the nature of a torn surface of gas black stocks and the appearance of micro sections of the stocks. The relation is so close that the degree of dispersion which is basically shown by micro sections may be measured by examining the surface. As a practical working tool standard samples of gas black stocks have been prepared and rated in per cent dispersion.

It has also been shown that the character of gas black agglomerates in rubber varies from a hard, rigid type to a soft, easily dispersed variety. A microscopic study of these agglomerates aids in understanding the properties of stocks. Raymond P. Allen and Frank K. Schoenfeld.

Dispersibility of Gas Black. II. Evaluation of Gas Blacks. When a pigment is dispersed, energy is needed for the internal friction of the batch, to deflocculate the pigment and to create the pigment-rubber interface. These energy factors have been studied for the system rubber-black under reproducible conditions. The effect of temperature, shearing forces, and wetting on carbon black dispersion has been investigated. It has been shown that to obtain the maximum in black dispersion the batch must be made receptive to black incorporation, and sufficiently intense shearing forces must be developed to break down the black agglomerates. A method of testing the processing characteristics of channel blacks is presented. Frank K. Schoenfeld and Raymond P. Allen.

Effect of Acicular Zinc Oxide on the Physical Properties of a Rubber Compound. In rubber stocks where resistance to tear is of no vital importance, acicular zinc oxide offers certain advantages which are not obtained with usual non-acicular type of zinc oxide.

Such properties as increased stiffness with no appreciable change in hardness or abrasion are of value in the formulation of certain rubber compounds, and this type of zinc oxide occupies a unique position in this respect. M. K. Easley.

Soft Vulcanized Rubber. The Relation between Combined Sulphur and Vulcanization. A series of rubber-sulphur compounds and a group of accelerated compounds were mixed and cured following a procedure standardized so that testing results are comparative. The batch stocks and sheets having a wide range of cures were tested for freezing, behavior on the mill, solubility, plasticity, hysteresis, and stress-strain.

While these properties changed with time of cure, they did not vary at the same rate, and there was no constant relation between the various rates. Compounds were obtained with 0.75% combined sulphur which were only slightly scorched while other compounds with the same amount of combined sulphur were well cured. Stocks in which the combined sulphur was more than 1.0% were scorched beyond the stage permitting processing. One compound was obtained which was well cured in 15 minutes at 142°C. (287.6°F.) and only scorched after 360 minutes at 142°C. although the combined sulphur was the same in both cures. It was found that heating in the press for 360 minutes at 142°C. does not materially degrade unvulcanized rubber or some types of vulcanized rubber.

It is concluded that there are at least 2 reactions which can cause vulcanization: (1) sulphur addition and (2) a non-sulphur reaction. Sulphur, especially in the presence of accelerators, catalyzes the second reaction. The change in physical properties may be attributed to the building up of a mechanical structure by 2 structure forming reactions. The properties of the vulcanizate depend to a considerable extent on the relative rates at which the 2 reactions take place. B. S. Garvey, Jr., W. D. White, and G. Thompson.

Basic Lead Carbonate with Organic Accelerators in the Vulcanization of Rubber. A study has been made, chiefly in high gas black stocks, of the activation of mercaptobenzothiazole and other thiazole accelerators with basic lead carbonate, or white lead. It is found that basic lead carbonate strongly activates these accelerators, more strongly than zinc oxide under identical compounding conditions. Fast curing stocks of high tensile result. The vulcanizing properties of the basic lead carbonate- and zinc oxide-activated stocks may be made equal by using less accelerator in the former. Cure interference by the adsorptive action of gas black, characteristic of zinc oxide activation, does not occur with basic lead carbonate.

In these respects basic lead carbonate resembles litharge, the action of which with mercaptobenzothiazole has been described previously. There is, however, an important difference between the basic carbonate and the oxide of lead: at the lower temperatures used in milling or calendering, the former is much less active than the latter, and mercaptobenzothiazole stocks activated with basic lead carbonate are as free from "scorching" as stocks employing zinc oxide.

In terms of the modern theory of the activation of accelerators it would appear that, at the higher temperatures, lead dissolves in the rubber about as readily from the basic carbonate as from the oxide, but that at the lower temperatures lead is less readily released in soluble form when the PbO is combined in the basic carbonate than when free in the form of litharge. J. R. Sheppard and W. J. Clapson.

The following abstract is that of a paper read at the Division of Colloid Chemistry.

Further Viscometric Studies of Rubber Solutions. Solutions of crepe rubber in toluene of from 0.08 to 2% concentration have been studied and found to be non-Newtonian liquids. Their viscosities in relation to the viscosities of the pure solvent are independent of the temperatures. Of the 2 explanations mostly offered for the phenomenon of the change of fluidity with shear, viz. (a) orientation, (b) disaggregation of the particles, the former therefore is ruled out. The latter is indicated by the shape of the consistency curve. This curve starts from the origin as a straight line; becomes curved from a definite point, with increasing slope; up to an inflection point; from there the slope decreases to a point where the curve again becomes a straight line, which, by extrapolation passes through the origin. This shape is explained as due to a disaggregation of the rubber particles through mechanical shear. Markus Reiner.

Akron Group

THE Akron Group, Rubber Division, A. C. S., at its winter meeting held February 27, at the Akron City Club, Akron, O., elected the following officers: chairman, Harry Bourne, general foreman, hose division, The B. F. Goodrich Co.; vice chairman, C. A. Carlton, of Seiberling Rubber Co.; and secretary-treasurer, E. H. Baker, manager, Binney & Smith Co., reelected.

Chicago Group

BECAUSE of uncertain financial conditions the Chicago Group, Rubber Division, A. C. S., decided to postpone to a more favorable time its meeting originally scheduled for March 10.

New York Group

THE New York Group, Rubber Division, A. C. S., will hold its next meeting on Friday, May 5, at the Building Trades Employers Association clubrooms, 2 Park Ave., New York, N. Y. Chairman A. R. Kemp states that the program will consist of several short papers comprising a symposium on a subject of great interest.

Vulcanized Bitumen

VULVANIZED bitumen is a product that has been used for many years, particularly by the European electric cable and insulated wire trade. It is characterized by excellent aging properties; resistance to heat, water, and oil; high di-electric strength; free milling; and smooth extruding qualities. The following figures represent its average analysis: specific gravity, 1.08 to 1.10; acetone extract, 35%; ash, 1 to 2%; free sulphur, ½%.

For insulated wire covering up to 20% of this material may be used in the rubber composition.

For heavy cables it is used straight as a center core on which to build up the cable. Also it is used straight as a moisture heat and insulating course surrounding the insulated wires protecting them from the heavy wire outside armor. The excellent insulating quality of this material is shown by the fact that a 440-volt heavy duty cable was required to pass a 20,000-volt test, and this cable made with vulcanized bitumen withstood 26,000 volts.

New Machines and Appliances

Flexible Lubricating Hose

Pressure Lubricating Hose

THE illustration represents a short length of high pressure flexible hose to which is attached couplings for attachment to various types of grease guns. The rubber tube used in the manufacture of this hose is said to be fully resistant to the action of grease. Therefore, although the internal diameter of the hose is only ¼-inch, there is no danger of its becoming closed by swelling of the rubber. The hose is designed to resist the high pressures used in service by being reenforced with several layers of steel wire and cotton winding. The bursting pressure is thus raised to 12,000 pounds per square inch.

This armored hose is unusually flexible; this point is of particular importance in automobile lubrication where greater flexibility means longer life. Armored Tube Co., Malden, Mass.

Synchronous Motor Drive

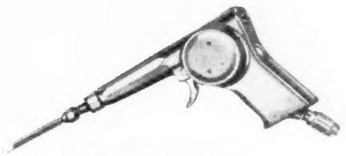
THE accompanying illustration shows a highly efficient and economical rubber mill drive operating 3 pairs of mixing rolls by means of a 250 h.p., 720 r.p.m. synchronous motor in combination with a gear reduction unit transmitting power to the lineshaft at 90 r.p.m. The unique feature of this drive is that the usual motor bearings and flexible coupling are eliminated by overhanging the rotor of the motor directly on the extended pinion shaft of the gear unit. This simplified assembly results in considerable saving of floor space as compared with a coupled drive. The gear unit is of the single helical type, equipped throughout with tapered roller bearings of liberal capacity. A combination geared motor drive of this type is not only applicable in rubber mills but can also be efficiently applied in many other industries.

The motor is controlled by a full voltage starter which embodies a dynamic braking contactor for bringing the motor to a quick stop in case of an accident. In an emergency the operator trips a safety switch which brings the motor to a quick stop, with only a few inches of travel on the surface of the roll. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Air Filer

THE pneumatic hand tool pictured on this page was developed to replace the tedious universally used hand method of filing. Its field is primarily in metal working, but admits of special applications to wood working. The pistol grip gives the filer a natural position in the hand, and the tool can be held for operation in any position for easy access to the work. There are but few moving parts, and these are lubricated by the air stream from a well in the pistol grip. The sequence of action of the filer is described as follows.

Air, under pressures of 30 to 100 pounds, enters the mechanism through an air hose connected to the pistol grip. This air is controlled by a trigger valve, which admits air to a rotary valve die cast into an air turbine. The position of this valve is always such that the air, under pressure, flows first to either end of the piston cylinder. This action drives the piston forward or backward, as the case may be, through half a cycle, uncovering the exhaust port. This port is connected to the nozzles of the air turbine, and the exhaust drives the air turbine attached to the rotary valve. The latter, turned by the turbine, directs the air supply alternately to each side of the piston so that the cycle is completed and automatically repeated.



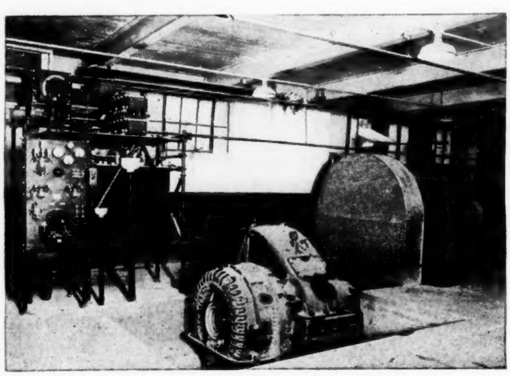
Kipp Air Filer

The piston motion not only valves the exhaust port, but being part of the spindle, its pulsating energy is transmitted to the file. The speed of the piston is fixed by the speed of rotation of the turbine; therefore one turn of the turbine means one turn of the rotary valve and a forward and backward movement of the piston. In other words, when the r.p.m. of the turbine is 5,000, there will be 5,000 forward and backward strokes of the piston, which means 5,000 cutting strokes of the file per minute. The speed may be varied by pressing the trigger valve to any desired position. The weight of the filer is 1½ pounds; the length is 7 inches. Madison-Kipp Corp., Madison, Wis.

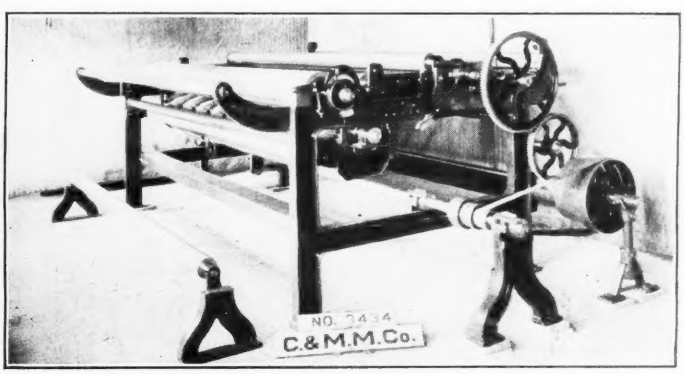
Latex Sizing Machine

IT HAS been the practice for many years in the carpet industry to apply a glue size to the back of carpeting. Rubber latex preparations are now being substituted for glue in this treatment.

The machine used in this connection is an adaptation of that designed for applying the size and is pictured in the accompanying illustration. It comprises a metal frame supporting a driving shaft geared to a series of rollers of small diameter which function to draw the carpeting past the sizing roller. The latter revolves partly submerged in the liquid latex size tank and thus transfers a film of size to the back of the carpet as it passes in contact with the wet sizing roller. The goods after sizing pass over suitably arranged rollers back of and under the machine.



Westinghouse Rubber Mill Drive



Curtis & Marble Carpet Sizing Machine

After clearing which they turn upward and continue through a drier or continuous vulcanizer suspended from the ceiling. Curtis & Marble Machine Co., Worcester, Mass.

Valve for Liquid Latex

ORDINARY forms of valves are found somewhat unsuited for use in handling latex because they do not offer a full smooth bore passage for the flow of the material and therefore become more or less clogged at intervals by accumulation of coagulum.

The illustration pictures a motor operated pinch valve that permits positive flow control of liquids of all kinds. The device is applied to the exterior of a short piece of rubber hose that is interposed in the pipe line at any convenient point. It consists of a pair of pinching rollers linked together by a toggle joint operated by a lever. By this device the rollers are made to pinch the rubber hose, thus regulating the flow of the latex or stopping it completely. There are no internal parts to hinder the flow or cause clogging.

The device is also adaptable for controlling the flow of corrosive chemicals. Automatic Temperature Control Co., Inc., 34 E. Logan St., Philadelphia, Pa.

Spray Gun

A VERY useful spray gun has been developed for spraying paints, lacquers, and metal finishes in either round or fan-shaped delivery. This is a high-speed commercial gun with siphon feed capable of spraying a full quart of material in 2 minutes or less. The liquid container is aluminum of 1-quart capacity. The gun is provided with 2 interchangeable nozzles, one for round and one for fan spray. The nozzles screw in and out, working like a valve on the air flow. Paint passages may be cleaned by forcing the air through when the nozzle is screwed out beyond the tip of the fluid tip by pulling the trigger.

The fact that the gun has a siphon feed means that there is no pressure in the liquid cup, and it can be used on pressure material tanks instead of using the quart container. A half horsepower air compressor gives the best results with this tool. Lower powered compressors will not operate it to full efficiency. Air pressure of 10 pounds or more is necessary, depending on the density of the liquid to be sprayed. An air volume of 2 cubic feet is required for a round spray and 3½ cubic feet for a fan

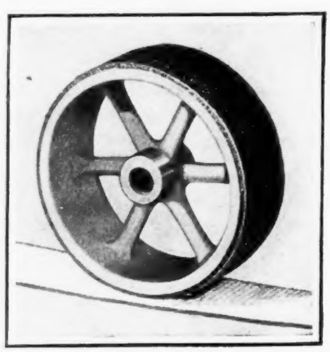
Andrews Spray Gun

spray. Andrews Spray Equipment Co., 740 Superior Ave., N. W., Cleveland, O.

Pulley Surface Covering

THE injurious effects of belt drive slippage, loss of power, and increased wear and tear on equipment due to the use of over-tight belts can be eliminated in large degree by a modern practical method of pulley surface covering designed to increase frictional contact between the belt and the pulley face.

The covering consists of a specially processed waterproofed duck firmly attached to any flat or crowned pulley by means of a special vegetable and oil cement composition characterized by quick drying and strongly adhesive quality. When attached by this cement to the face of a wood, iron, steel, or paper pulley, the covering fabric becomes a part of the pulley itself, is not affected by acids, steam, or climatic conditions, and forms a semi-



Gripwell Pulley Covering

elastic surface readily gripped by leather, rubber, or woven belting. Gripwell Mfg. Co., 105 W. 40th St., New York, N. Y.

Double Disk Gate Valve

THE gate valve here pictured embodies valuable features of design and construction that are of much practical importance in service. Certain of these features are here noted particularly. The disks that seat the valve are accurately guided by grooves in both disks that engage corresponding long guides in the valve body. Perfect alinement is thus assured, prolonging the life of the seating surfaces by eliminating scoring them. Between the disks are ball and socket bearings which insure uniform wedging action. There are no internal wedging devices between the disks to get out of order or collect deposits of incrustation; and the disks readily adjust themselves to the taper seats.

These valves are repackable under pressure while wide open because a shoulder above the stem threads forms a tight contact with perfect seat under the stuffing box in the upper part of the bonnet. This protected seating arrangement is up out of the way where scale and incrustation are not liable to collect.

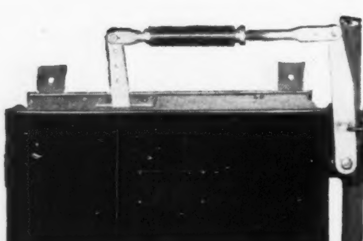
The entire valve is marked by quality of design, material, and workmanship for the attainment of durability and satisfaction in service. The Lunkenheimer Co., Cincinnati, O.

Cement Can Filler

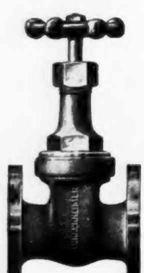
THIS small bench machine was designed for filling cans, jars, etc., with rubber cement, where an assured quantity is desired. It is adjustable for any variation within its capacity, i. e., from ⅛-pint to 1 quart. By moving the crank pin away from or toward the center the stroke is lengthened or shortened and the quantity regulated accordingly. Its capacity is 20 fillings per minute. Power required is ⅛ h. p.

Connection is usually made with standard iron or brass pipe from pump valve to supply tank, which should be placed above the filler so that the material will flow freely to the pump valve. The machine has a clutch connected to a foot treadle which leaves the operator free use of both hands for handling the packages.

The device is adapted for liquids, but not for materials in paste form. Arthur Colton Co., Detroit, Mich.



Controller Pinch Valve



Gate Valve

Colton Can Filler

New Goods and Specialties

Improved General Tire

HUNDREDS of sharply cut prisms of resilient rubber form the sidewall of the new General Streamline Jumbo tire, just perfected by engineers of The General Tire & Rubber Co., Akron O. Design of the inner section of the sidewall gives the effect of moire silk.

The new streamline Jumbo has been strengthened structurally but embodies the

New Streamline Jumbo

same principles of construction that have featured this tire since its introduction a year ago. The tire differs radically from all other types of conventional super-balloon or so-called "doughnut" tires. Its shape is pyramidal; its almost straight sidewalls taper from a tread no wider than that of the ordinary balloon tire it replaces to a base wider than any other part of the tire. Built like a cantilever bridge, the tire has maximum stability because of its broad base; while the narrow tread makes steering and parking easy. The many sidewall prisms on the new tire slow down the reaction of air compression when the tire strikes bumps or depressions in the surface, snubbing the return shock and producing, in effect, "lazy rubber" riding ease.

Superior Water Bottle

IN AN effort to protect patients from injury in case any rubber druggists' sundries should suddenly give way while in use, the United States Rubber Co., 1790 Broadway, New York, N. Y., has perfected cloth inserted merchandise for hospital supplies and the like. This rubber with its stockinet insertion on the inside has superior tear resisting qualities unheard of with unprotected rubber. The material is perfect for such sundries as

Cloth Inserted Hot Water Bottle

hot water bottles, ice bags, throat bags, invalid cushions, etc.

Rubber Deodorants

THE use of deodorants in rubber goods was at first considered of value chiefly to impart a more pleasing odor to the users of druggists' sundries and other rubber goods for household use. It is now found that deodorants hold interesting possibilities in brake linings, rubberized carpeting, insulation, synthetic rubbers, and even certain roofing compounds. The use of deodorants may be for one of 2 purposes: either to make the goods smell better or to mask the odor of certain materials in the compound which the manufacturer wishes to conceal from competitors.

Another feature that has developed is the use of much smaller quantities of deodorants in most rubber household goods in quest of a virtually neutral odor rather than the introduction of a positive new scent. This seems logical for too strong a perfume odor could give rise to objections to the particular odor type selected by the individual manufacturer.

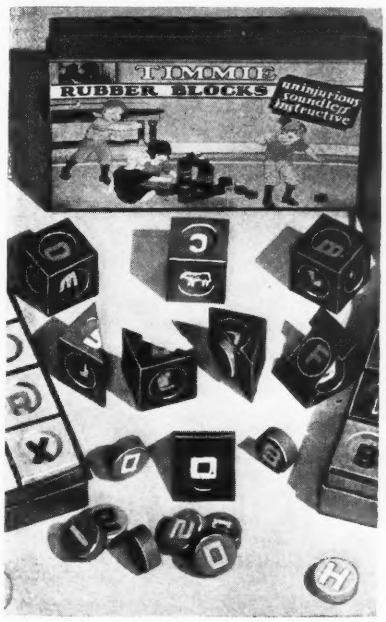
Therefore, when properly employed, a definite field exists for deodorants in the rubber industry. If the present trend continues, deodorants will be used in rubber products that at first thought would not appear to require a deodorant or where it would seem economically unwise to utilize them. Givaudan-Delawanna, Inc., 80 Fifth Ave., New York, N. Y.

Sponge Rubber Blocks

THESE blocks are intended for building and educational blocks and toys. Heretofore blocks have been made of wood, metal, or other rigid material, and through their use children hurt themselves or damage floors, tables, etc., where the blocks are used. They are often left on the floors, and both children and adults are subject to injury through falling or stumbling over them. Besides if the boys throw these blocks at one another, as they have a habit of doing, damage can result. But not so with Timmies, for one of the objects of this invention is to provide a building block that may be used by children without damage in any way.

Many other advantages are claimed for these toys. Being of sponge rubber they have long life; they are easily cleaned; water will not harm them, and they float.

These blocks are made in gay colors with letters, numbers, and pictures thereon. They can build ingenious forms for they fit and are held together by dowels. The



Timmie Building Blocks

half-blocks have beveled edges. John H. Doak, Box 131, Multnomah, Ore.

Perfumed Balls for Dogs

ALL dog owners are aware of their pets' sweet tooth and equally (and expensively) aware of the ill effects of pampering the canine with candy. To satisfy his craving to a certain extent is possible, however, by offering Man's Four-Legged Friend playthings delicately scented with the odor of chocolate. One such toy, one of the Scentoys which include also hard rubber bones and rings, is a solid rubber ball, chewy, but said to resist the dog's destructive teeth; and the ball smells like a piece of chocolate candy. What more could any dog want? Maxwell Rubber Products Corp., 181 Verona Ave., Newark, N. J.

Rubber Industry in America

OHIO

Reduction of Tire Lines

The B. F. Goodrich Co., Akron, O., United States Rubber Co., 1790 Broadway, New York, N. Y., and The Goodyear Tire & Rubber Co., Akron, within a short time of one another each announced a reduction in the number of tire lines they would produce and corresponding cuts in tire prices. Goodrich will market only 2 lines of tires carrying the Goodrich name: Goodrich Silvertown and Goodrich Cavalier. All other lines and types will be eliminated. The plan, effective March 21, will necessitate lower list prices than before the change.

U. S. Rubber formerly manufactured 5 lines. Now it will build and sell through its dealers only 2 high quality lines of passenger car tires, U. S. Royal and U. S. Peerless, and only one brand of truck tires of the highest quality, U. S. Royal Heavy Service.

Goodyear has discontinued its third and fourth lines of tires and announced a new price schedule, effective immediately. The concern will concentrate on the All Weather tire for the quality market and the Pathfinder for the competitive price market.

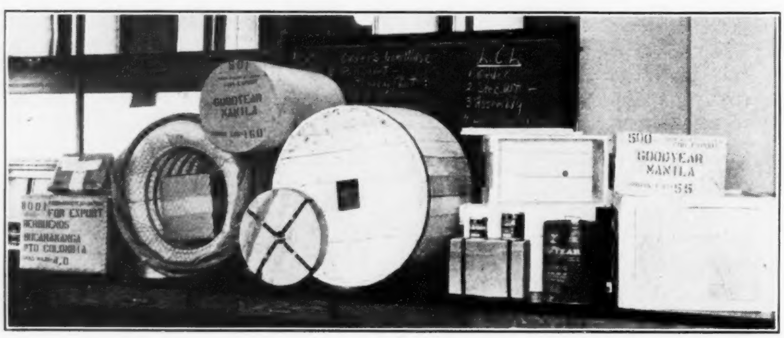
R. P. Bremer, president of the Master Tire & Rubber Co., Akron, which operates the Falls Rubber Co., Cooper Corp., and Giant Tire & Rubber Co., stated that his company would follow suit by cutting out tire lines and reducing prices.

The reason for this action on the part of tire manufacturers may well be summarized in the following statement by the Goodrich president, James D. Tew:

"By the elimination of all but 2 lines, factory and distributing costs will be materially reduced, which eventually should benefit the employe, the security holder, the dealer, and the general public. We feel that if this policy is followed throughout the industry, reasonable profits should be realized in the not too distant future."

The General Tire & Rubber Co., Akron, has taken over management control of Compania Hulera el Popo, S.A., Mexico City, Mexico, announced W. O'Neil, General president, upon his return to Akron by air from Mexico City, accompanied by Joseph A. Andreoli, vice president, General Tire Export Co. Tires in the Mexican plant, which has a daily capacity of 500 tires, will be manufactured under the trade name "General Popo." Output at General's Akron plant will not be affected by this agreement, which makes possible supplying General's Mexican trade more advantageously and recognizes the future potentialities for increased business in Mexico. Officers of the Mexican company will remain as before, with the addition of Mr. O'Neil to the directorate and the appointment of Alfredo Guijarro, General's Mexican manager, as el Popo's general sales manager. He will also act in Mexico City as local alternate director for Mr. O'Neil. Ing. Ramon D. Cruz, Hulera's managing director, will continue in that position. Epigmenio Ibarra, Jr., president of the Banco de Mexico, is president of the Mexican tire firm, and M. E. Otalora and A. D. Lombardo are other directors.

W. G. Klauss, who recently resigned as president of the India Tire & Rubber Co., Akron, has been named its operating agent by Receiver Paul Weick, who was appointed when the firm went into receivership shortly after the resignation of Mr. Klauss and Treasurer L. B. Baker. Their successors have not been appointed. In the reorganization that followed the introduction of the receiver, Chairman of the Board F. A. Scott, Founder J. M. Alderfer, and Secretary Sterling W. Alderfer were let go. Mr. Klauss, as active head of the company, ordered an immediate increase in production and reassured India dealers of the continued operation of the company.



Goodyear Products Packed for Export to Foreign Countries

Goodyear Notes

The Goodyear Tire & Rubber Co., Akron, in its shipping course at its University emphasizes the point that the fundamental idea of all packaging is to assure that the material arrives in first class condition. Of primary importance are large clear stencils for address, weight, and other identification marks.

In export shipping an ordinary wooden box is exchanged for an Aquatite, of plied-up wood, which saves weight and cubage and will not shrink in drying out to allow dirt and moisture to enter cracks thus formed. This same plywood can be bound with metal straps to form a strong, light package for coiled products like small belts.

A whole set of 5 Airwheels travels safely in a fiber drum as shown in the illustration; yet there is a saving of over 20 pounds in weight and nearly 2 feet in cubage.

A unique method of shipping bulky articles like pneumatic tires has been devised. The paper wrapped casings are baled, and the bale slipped into a burlap covering. The inside space formed by the beads of the tires is utilized also as a compartment for cartons of tubes or accessories. Then a strip of small mesh chicken wire is attached to each end of the bale effectively to block any pilfering.

On March 11 before a huge crowd at the Goodyear-Zeppelin Corp.'s hangar, Akron, Mrs. Wm. A. Moffett, wife of Admiral Moffett, chief of the United States Navy's Bureau of Aeronautics, christened the *U. S. S. Macon*, sister ship of the *Akron*, also built by Goodyear. Short speeches were made, and the congratulatory telegram of President Roosevelt to the admiral and the latter's reply were read by Paul Litchfield, Goodyear president.

Macon trial flights, tentatively set for March 30, depending on the weather, will take about 6 weeks. When accepted by the Navy she will fly directly to the new naval hangar at Sunnyvale, Calif.

The *Akron*, christened in August, 1931, was launched the next month. Both airships have helium gas capacities of 6,500,000 cubic feet, and both are identical in size and shape, but several efficiency changes resulting from experience with the *Akron* are incorporated in the *Macon* which will be about 8,000 pounds lighter than the *Akron*, yet of the same strength. Important weight saving improvements were effected in the gas cells, electrical system, and engine mountings. A compartment for 5 scout airplanes that can be detached and recovered during flight by a trapeze of improved design is a feature of both dirigibles.

The B. F. Goodrich Co., Akron, has granted a license to manufacture tires and tubes in Mexico to Compania Manufacturera de Artefactos de Hule Euzkadi, Mexico City, which was organized in 1925 to produce miscellaneous rubber goods. R. F. Moody, formerly Goodrich tire production engineer, has been engaged by Euzkadi as plant superintendent. It was stated that Goodrich has no financial interest in Euzkadi and will continue to supply products from Akron to Mexican trade through Cia Tecnica y Mercantil, S. A., Goodrich distributor in Mexico City.

Lowry T. Drake has been named manager of the Grand Rapids, Mich., store of Goodrich Silvertown, Inc., Goodrich retail division, announced Vice President S. B. Robertson. Mr. Drake started with Goodrich in 1915 and has had varied experience in the sales field. He was made manager of the Goodrich store in Youngstown in March, 1932, and then transferred to special sales work previous to this new appointment.

Barr Rubber Products Co., Sandusky, at a recent stockholders' meeting reelected its officers and directors.

The Cincinnati Rubber Mfg. Co., manufacturer of mechanical rubber goods, Cincinnati, through Vice President J. F. Joseph reported the letting of contracts for the installation of a new 400 h.p. high pressure boiler and a new concrete stack and coal handling and storage unit at a cost of $75,000.

Leonard Firestone, son of Harvey S. Firestone, Sr., chairman of the board of the Firestone organization, recently took over his duties as vice president of the Firestone Tire & Rubber Co. of California, Los Angeles, Calif., where he will direct its service stores department, a phase of the business in which he has specialized since his graduation from Princeton in 1931.

National Association of Waste Material Dealers, Inc., because of the unsettled banking situation throughout the country decided to postpone its twentieth annual convention scheduled for March 13-15 at the Hotel Sherman, Chicago, Ill. Arrangements are being made for a more favorable future date, when the very fine program already planned will be held.

Hy-Lindy Golf Ball Co., Lynchburg, Va., owned by Edgar M. Shaner, handles golf balls.

George W. White, president and director of Imperial Chemical Industries, Ltd., 285 Madison Ave., New York, N. Y., has been elected a director of United Carbon Co., Charleston, W. Va. In December, 1922, Mr. White came to the United States to Nobel Industries, Ltd., New York, now Imperial Chemical Industries (New York), Ltd. He is also on the board of Canadian Industries, Ltd., of C. Tennant Sons & Co. of New York, Ltd., and of American Murex Corp. Among its many activities Imperial Chemical Industries, Ltd., distributes carbon black produced by United Carbon Co.

EASTERN AND SOUTHERN

The Martin Rubber Co., Long Island City, N. Y., has recently added to its molded products a line of rubber stopples in a variety of colors designed principally for use with medicine bottles. It is stated that the compounding is such that the stopples remain pliable indefinitely.

Ira I. Slomon, manufacturer of "U-Glu" products, 31-27 Thomson Ave., Long Island City, N. Y., displayed quick and helpful clear thinking when the sudden bank holiday struck unprepared New York on March 4. That was pay day in his plant, but sufficient cash was not available; so Mr. Slomon gave each of his 6 employes a letter bearing his signature, which read:

"To whom it may concern: This scrip is issued for the sum of $—. It will be honored by the maker the same as money and will be accepted in trade or may be presented at the Bank of Manhattan, Hollis, L. I., branch, upon reopening."

This scrip plan, one of the first here, worked out as its originator had planned. His bookkeeper took her scrip to a restaurant in the building, owned by Mr. Slomon, where it was accepted as cash. The proprietor of the restaurant sent the scrip back to his landlord as part payment on his March rent, and again it was accepted at its face value.

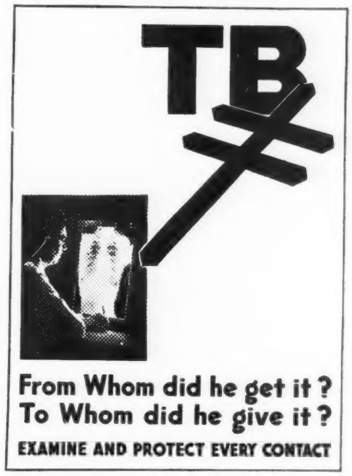
The Slomon plant features a crude rubber and nitro cellulose laboratory and is headquarters for rubber cements, lacquers, sizings, shellacs, varnishes, chemicals, and special formulas. Mr. Slomon, who established this business in 1912, is the originator of millinery glue.

C. Harold Smith, late president, Binney & Smith Co., 41 E. 42nd St., New York, N. Y., who died August 31, 1931, left an estate now appraised at $4,594,926 gross and $2,692,172 net, no part of which was left in public bequests.

Kelly-Springfield Tire Co., 1775 Broadway, New York, N. Y., through President William H. Lalley has announced that its credit policy in effect prior to March 4 will be continued, believing that continued judicious extension of credit will materially help in alleviating present chaotic conditions. Mr. Lalley also declared that in the interest of common good further ruthless price cutting must be curtailed.

Kelly-Springfield stockholders recently were informed by their president that operations are about 29% below those of 1932. Henry S. Bowers was elected to the board to fill the place of Arthur Sachs, whose term expired. Other retiring directors were reelected. Vacancies in the dirctorate of M. B. Muxen, deceased, and F. W. Main, resigned, were not filled.

Everflow Stitching Wax Co., Kilmarnock, Va., manufactures The Drifast Tom Rubber Cement, especially adapted for attaching rubber heels and soles and leather soles.



SMALL POSTER FOR THE CAMPAIGN

The National Tuberculosis Association and its 2,084 affiliated associations each year throughout the country strive to focus public attention on a single pertinent fact about tuberculosis through the medium of an educational campaign. Beginning April 1, this educational message will urge that whenever a case of tuberculosis is discovered, every contact should be examined. In numerous ways persons will be helped to find out if they have the disease, to secure proper treatment, and to learn to protect others. Emphasis will be laid on the danger of the disease to children and the necessity of examining them with the tuberculin test and the X-ray. The slogan for the campaign will be "Examine and Protect Every Contact."

Pennsylvania Rubber Co. of America, Inc., Jeannette, Pa., according to President W. O. Rutherford, who made the announcement at a recent meeting of the directorate, in its operations for 1932 showed a satisfactory net profit due, it is reported, to the company's plan of diversification in that it manufactures automobile and bicycle tires, tubes, tennis and play balls, molded goods, and rubber specialties. For 1932, 3 departments, tennis balls, bicycle tires, and play balls and toys, enjoyed new all-time sales peaks. Bicycle tires had the largest output in the company's 3 decades of manufacturing them. J. C. Rutherford is Pennsylvania's advertising manager.

Hewitt-Gutta Percha Rubber Corp., Buffalo, N. Y., has moved the headquarters for its Middle Atlantic Division from Philadelphia to 412 Water St., Baltimore, Md., states manager R. W. Ford, to have a more centralized location for the Division, which includes New Jersey south of Trenton, Pennsylvania west to Altoona, Delaware, Maryland, District of Columbia, Virginia, eastern Tennessee, and the eastern border of West Virginia.

FINANCIAL

United States Rubber Co.

TO THE STOCKHOLDERS: This report covers the operations of the company for the year 1932 and its consolidated balance sheet as of December 31, 1932.

After all discounts and allowances, net sales for 1932 amounted to $78,300,091 compared with $114,132,055 for 1931, a decrease of $35,831,964 or 31.40%. Neither of these amounts includes sales of tires by Samson Tire & Rubber Corp. and Gillette Rubber Co., controlled companies, sales of which were approximately $9,600,000 in 1932 and $12,000,000 in 1931.

A loss of $3,076,333 was sustained for the year after interest on funded indebtedness of $4,381,519, but before provision for depreciation of $6,541,313 and net adjustments of $740,728. The charge to surplus for the year amounted to $10,358,374.

The Federal Manufacturers' Excise Tax on tires and tubes became effective on June 21, 1932 The amount paid to the government on account of this tax has been deducted from the sales of the company. The tire industry has paid as excise tax more than $7,545,000 since the tax came into effect. This seems an unreasonable burden to put upon one industry when the great majority of industries are exempt from excise taxes.

On December 31, 1932, total current assets were $48,228,364, including $12,303,-473 in cash. Total current and accrued liabilities were $15,742,560, including $1,-065,000 of 6½% Serial Gold Notes maturing March 1, 1933, and $8,699,000 of 6% Secured Gold Notes maturing June 1, 1933. The ratio of current assets to current liabilities was 3.06 to 1.

Inventories of raw materials, goods in process of manufacture, and finished goods were adjusted to the lower of cost or market prices of the component raw materials. An adequate contingent reserve was available to reduce commitments to market prices.

Current assets, current liabilities, securities owned, and outstanding bonds of foreign subsidiaries were converted at the rates of exchange prevailing at the close of the year. Sales and earnings were converted at monthly average rates of exchange.

Securities of controlled companies are included among the investments of the company at cost or book value, amounting to $3,766,930. The net worth of these securities on December 31, 1932, was $4,-589,829. The increase in net worth for the year was $129,280.

During the year bonds and notes of the company were purchased at current market prices for future redemption. The difference between par and purchase price resulted in a credit of $1,449,103. Total outstanding funded and long term indebtedness was reduced $8,353,632, and interest on funded indebtedness was reduced from $4,892,736 in 1931 to $4,381,519 in 1932.

In addition to the securities purchased for redemption the trustees of the Insurance Fund purchased during the year bonds and notes of the company having a par value of $752,000 at a cost of $420,681.

The land at 1790 Broadway, New York, was bought during 1932, and the first mortgage thereon is shown as a long term indebtedness. The company owns the U. S. Rubber Building on this site, but previously had leased the land, which lease expired during the year.

Properties, plants, and equipment had a book value at the beginning of the year of $87,331,698. Capital expenditures amounting to $2,340,873, less sales of properties and disposition of equipment having a book value of $402,537 and provision for depreciation of $6,541,313 caused a net reduction in book value of $4,602,977 for the year. The net book value on December 31, 1932, was $82,728,721. Idle properties available for sale had a net book value of $18,885,838 at December 31, 1932. No depreciation was accrued upon these properties for the year.

The common stock, consisting of 1,464,-371 shares of no par value, had a net worth of $12,858,404 or $8.78 a share, after deducting the value of goodwill, patents, etc., carried on the books of the company.

There was a loss on plantations of $280,-245 before depreciation of $410,860 which resulted in a charge of $691,105 to surplus for the year. Accrual of amortization based upon the estimated useful life of the trees has been suspended in view of the reserves previously created. The market price of crude rubber continued to decline during the year and was at slightly above 3¢ a pound at the close of 1932.

Production for 1932 was 48,674,000 pounds, an increase of 6,863,000 pounds over 1931; 99,431 acres are planted; and 74,066 acres are in bearing, with an average yield per acre of 657 pounds.

F. B. DAVIS, JR.,
Chairman

New York, N. Y.,
March 1, 1933.

The Fisk Rubber Co.

C. A. Dana and J. D. Pierce, receivers for The Fisk Rubber Co., report a loss for 1932 of $136,363, before providing for receivership expenditures, compared with a loss of $128,517, before similar charges, in the preceding year. Gross sales totaled $11,566,329, against $18,188,069 in 1931.

The report shows cash and bank balances and United States treasury bills and notes of $9,011,331, against $6,492,761 at the close of 1931. Net current assets totaled $14,549,029, against $15,204,993. Inventories were reduced from $4,655,791 to $2,641,554 at the end of 1932.

On February 11, 1933, the United States District Court entered a decree directing sale at Chicopee Falls, Mass., of substantially all Fisk assets and property, except for $7,000,000, then in the hands of the receivers. April 3, 1933, has been fixed as the date of sale.

Intercontinental Rubber Co.

TO THE STOCKHOLDERS: The average New York spot price of standard smoked plantation rubber during 1932 was 3.44¢ per pound as compared to 6.17¢ in 1931, 11.98¢ in 1930, and 20.48¢ in 1929. Under such conditions all producing entities have continued to suffer losses, and still total world production was slightly in excess of a shrinking total demand, particularly from America.

Our Sumatra properties were visited by the president of the company, and further measures of economy were worked out with the efficient local management. Among other things, unproductive reserve concessions totaling 10,320 acres were surrendered to the Government, thus leaving us with 11,985 acres, of which 4,714 have been planted. All producers in Holland's colonial possessions have been handicapped in cost competition with countries that had abandoned the gold standard. That uncontrolled production has thus far continued need not be taken as a criterion of the future, especially in view of the critical developments of the recent past.

Our Sumatra production for 1932 was 1,943,556 pounds from 3,924 acres in tapping. Certain of the lower yielding trees have now been thrown out of tapping, and this will counterbalance a further natural increased yield from the remainder in 1933. Advantage was taken of a speculative and premature increase in prices last August to sell for 1933 delivery approximately ½ of the anticipated 1933 production at average prices slightly in excess of the cash cost of production and delivery.

Most of the guayule shrub planted in California in past years was on leased lands carrying a fixed annual rental. Because of the obvious impossibility of continuing this development in the face of unprecedented rubber prices, the operating company solicited and obtained the cooperation of land-owners and farmers under modified contracts that in effect made them partners in the enterprise. Having proved the practical feasibility of rubber production in the Temperate Zone, it remains for the future to determine the degree or extent of its application.

The extensive properties of your company's subsidiaries in Mexico continue on a care and maintenance basis. Efforts to reduce the heavy tax burden have resulted in moderate success, but something additional is justified and required by the circumstances, and we are hopeful of securing further relief.

Provision has been made to reduce the value of rubber inventories to the market as of December 31, 1932. It will also be noted that the marketable short-term notes have been written down from their par value, $150,000, to market value at December 31, 1932, to present a more accurate exhibit of assets at that date.

GEORGE H. CARNAHAN,
President

Wilmington, Del.
March 16, 1933.

OBITUARY

Justus D. Anderson

Veteran Rubber Man

JUSTUS DOANE ANDERSON, for over 30 years prominently identified with the rubber industry, died at his home in Springfield, Mass., March 3, after a brief illness. He was born at Chatham, Mass., September 10, 1870, educated in Chatham and Boston schools, and graduated from Bryant & Stratton Commercial School in 1886.

He then entered the employ of Charles H. North & Co. In 1890, succumbing to the bicycle craze, he joined the Pope Mfg. Co., occupying various posts both in Boston and at Hartford, Conn. But in 1895, his interest shifting to tires, Mr. Anderson went to the Hartford Rubber Works, as its secretary.

His activities next were marked by a series of rapid and progressive steps. The Hartford company was absorbed, with other concerns, into the Rubber Goods Mfg. Co., which, with its affiliates, was ultimately forged into the United States Tire Co., now part of the United States Rubber Co. Successively, Mr. Anderson became manager of the G & J Tire Co. and of Morgan & Wright; vice president of the Hartford Rubber Works; president of G & J; then president of Hartford Rubber Works. In 1911 he was appointed general sales manager of the U. S. company. He resigned in 1914.

The next year saw him at the Fisk Rubber Co., Chicopee Falls, Mass., on special assignment, and within a few months he was made sales manager. Early in 1916 he became vice president and production manager. In 1925 he assumed supervision of 3 Fisk divisions. His work included responsibility for the operation of the tire manufacturing plants at Chicopee Falls and Cudahy, Wis., and also the Ninigret Division, which had 4 fabric plants in Massachusetts, Rhode Island, and Connecticut. Mr. Anderson left Fisk in 1927. He was subsequently connected with Jackson-Babbitt, Inc., New York, N. Y.

The deceased was president of The Tire & Rim Association, Inc., in 1925-26, and was also a director for many years.

Mr. Anderson is survived by a daughter, a son, and 2 grandchildren. Funeral services were held at the Anderson home. Interment was in Hill Crest Cemetery.

Color Manufacturer

JOSEPH M. HUBER, president of J. M. Huber, Inc., 460 W. 34th St., New York, N. Y., and affiliated companies, died at his home, Locust, N. J., on March 3. He was born in Munich, Germany, in 1858, and began his business career with his father, head of the firm of Michael Huber, leading European color manufacturer, which business had been established in 1780. At the age of 25 Joseph Huber came to this country and established a color importing business in New York. As the business expanded, he erected his own color factory here and later undertook the manufacture of printing inks, originally as an outlet for the dry colors. The ink business developed rapidly.

In 1915 Mr. Huber was faced with an acute shortage of carbon black for his inks, owing to the rather sudden adoption of that pigment by the rubber industry. Consequently he acquired gas leases in West Virginia, then the chief production field, and built the first Huber carbon black plant. This was the starting point of a steady growth to the important position which the company holds in the carbon black industry today.

The successful development of the varied enterprises bearing his name is a real tribute to the unusual executive and business ability of Joseph M. Huber, and his loss will be keenly felt by his friends in the many fields of American industry with which he came in contact.

Essex Employe

BARCLAY L. STOKES, for many years with the Essex Rubber Co., Trenton, N. J., died recently at the Burlington County Hospital, Mount Holly, N. J., after an operation. He was born in Medford, N. J., 86 years ago, and had lived in Trenton since a boy. Mr. Stokes belonged to the Masons for over 50 years. He leaves no survivors.

Harris Kenner

HARRIS KENNER, 74, vice president of the American Insulated Wire Corp. until his retirement about 4 years ago, died at his home in Providence, R. I., March 5. He was born in Russia, but came to this country about 40 years ago, settling in Providence. For a number of years he conducted a retail grocery business before joining the wire concern, which had been founded by his son, Barney, and his son-in-law, Jacob Kenner. Harris Kenner is survived by his wife, 3 sons, and 3 daughters.

William C. State

Goodyear Engineer

WILLIAM C. STATE, an inventor who changed the history of the rubber industry, died in Akron, O., on March 21 of complications following an illness of several months. During his 32 years in the tire industry, all of which were with the Goodyear Tire & Rubber Co., Mr. State contributed many inventions and improvements to rubber manufacturing machinery, most outstanding of which was the tire building machine equipped with a mechanical stitching device patented as early as 1909. Joining Goodyear in 1901, he almost immediately attracted the industry's attention with the invention of a new welding process and a portable device for mounting carriage tires. He was soon made master mechanic; then head of the engineering department, a post he held for 25 years; and for the last 5 years he was consulting engineer.

Practically all Goodyear manufacturing and storage plants at Akron, the Los Angeles plant of the company, and the great Goodyear-Zeppelin airship dock at Akron were built under Mr. State's direction. The airship dock, largest building in the world without interior supports, is perhaps his greatest building achievement. Mr. State also participated in designing and building Goodyear's plants and distributing branches throughout the world.

The deceased was born April 7, 1871, in Springfield, O., where he attended Wittenberg College. He is survived by his widow, a brother, and a sister.

Belgian Rubber Executive

OSCAR ENGLEBERT, who recently died, was born in Liege, Belgium, on May 3, 1866. In 1892 he founded the joint-stock limited company, O. Englebert Fils & Co., Liege, which he managed more than 40 years. The thorough knowledge of the rubber trade, the energy, foresight, and unceasing work which he

(Continued on page 52)

NEW JERSEY

Some lines of the rubber industry in New Jersey increased during the past month; while others remained normal. The hard rubber situation took an upward turn with an increased demand for various parts for radios. Orders are also gaining for rubber cloth of all kinds, and boots and shoes are holding their own. But tire production has not been up to normal for some time.

United States Rubber Co., 1790 Broadway, New York, N. Y., has let a contract to G. Siegler Co., Inc., 24 Journal Sq., Jersey City, for alterations on a 3-story basement brick and steel factory and warehouse at 25-27 Wilkinson Ave., Jersey City. The work will cost $28,000.

Essex Rubber Co., Trenton, is fairly busy at this time, and officials say no change occurred during the past few months. The company is optimistic over the future.

Joseph Stokes Rubber Co., Trenton, reports that business has shown a decided improvement during the past few weeks, and the company is now busy. The Canadian plant, however, finds no change.

Lambertville Rubber Co., Lambertville, continues busy with orders for rubber shoes and boots. Milder weather is expected to cause a let-up in production. The company is razing 2 of its old useless factory buildings. This action will allow the New Jersey State Highway Commission to widen the highway at that point.

Pierce-Roberts Rubber Co., Trenton, has been using a night shift the past month. Orders for all types of goods have increased, and the company is pleased with present conditions.

The Thermoid Co., Trenton. James A. Wheatley, Jr., sales manager of the automotive division, has returned from the Pacific Coast. L. R. Leaver, sales manager of the mechanical rubber department, also has been on a lengthy business trip to California and the western oil fields.

Acme Rubber Mfg. Co., Trenton, reports a gradual increase in the size of orders received during the past few weeks and expects the March output to show an increase of between 25 and 30% over January and February production. Company officials say that distributers' stocks are running low and that this condition is encouraging. The company anticipates continued improvement.

The Pocono Co., Trenton, has experienced a big change in business during the past month, and the factory is now very busy on all goods.

The Rubber Manufacturers' Association of New Jersey has decided to eliminate its spring meeting and to meet in June, when a dinner will be served and the members will engage in golf at the Trenton Country Club.

The Murray Rubber Co., Trenton, which has operated under a receivership for the past 2 years, has asked the City of Trenton to accept $20,000 cash settlement of the plant's back taxes amounting to $64,000. The request was made to enable the company to reorganize and prevent possible collapse of the business, which would throw out of work about 300 men. The proposal came from W. J. Hinson, representing creditors interested in reorganizing the company, who said the whole reorganization plan depends upon clearing the property of the tax lien. Mr. Hinson reported that Murray's 2 largest creditors are willing to accept large losses to effect a reorganization. The company reports that business is quiet now.

The Minor Rubber Co. has leased a store at 216 Market St., Newark.

Whitehead Bros. Rubber Co., Trenton, finds business continuing good in all lines.

Puritan Rubber Co., Trenton, is operating normally.

NEW ENGLAND

National Association of Purchasing Agents, 11 Park Place, New York, N. Y., will hold its eighteenth annual international convention and informashow at the Hotel Statler, Boston, Mass., June 12 to 15 inclusive.

Farrel-Birmingham Co., Inc., machinery manufacturer, Ansonia, Conn., at the stockholders' recent annual meeting elected the following directors: Chas. F. Bliss, Henry F. Wanning, Franklin Farrel, Jr., Nelson W. Pickering, Frederick M. Drew, Jr., David R. Bowen, Carl Hitchcock, Franklin R. Hoadley, Armin G. Kessler, Walter Perry, Julius G. Day, Fernley H. Banbury, Wm. B. Marvin, Edw. H. Green, Wm. A. Gordon, Alton A. Cheney, and Geo. C. Bryant. Alton Farrel, connected with the company for 30 years, 20 of which as treasurer, resigned as treasurer and director because of illness. After the stockholders' meeting the directorate gathered and elected the following officers: Mr. Farrel, Jr., chairman of the board; Mr. Pickering, president; Messrs. Bowen, Hitchcock, Hoadley, and Kessler, vice presidents; Mr. Drew, Jr., treasurer; Laurie K. Blackman, assistant treasurer; Mr. Bryant, secretary; and Mr. Marvin, assistant secretary.

Devon Mills, New Bedford, Mass., tire fabric division of The Goodyear Tire & Rubber Co., Akron, O., which had been operating on a one-shift curtailed schedule, now uses a double shift, both on full time, to handle orders from the parent organization. L. S. Hall, manufacturing agent of the mills, reported that 550 additional workers had been taken on. The new schedule will continue indefinitely.

Globe Rubber Works, Inc., 45 High St., Boston, Mass., through A. I. Knowles has announced that Fred W. Blanchard, formerly with the mechanical department of the United States Rubber Co., has joined the Globe organization, traveling local territory as well as that south of Boston. The firm, of which Winfield S. Knowles is president, makes hose, packings, mats and matting, gaskets, tubings, sponge rubber, and molded goods and is distributer for Lark Golf and Evergreen sprinklers and Eastman connections.

The Armstrong Rubber Co., Inc., manufacturer of automobile tires and tubes, West Haven, Conn., reports that for the past 18 years it has maintained an uninterrupted record of discounting its bills when due and during this period of financial stress it is conducting itself on the basis of "business as usual." Customers' checks are being accepted as heretofore.

George T. Jones has been appointed by the Superior Court, receiver of the property, assets, and business of the Davis-Jones Insulated Wire Co., Phillipsdale, R. I., and authorized to conduct it as a going business under bond of $10,000 until further order of the court.

Hope Webbing Co., Pawtucket, R. I., officers and directors were reelected at a recent annual meeting of the stockholders and the directorate. The officers include Charles A. Horton, president and general manager; Attmore A. Tucker, vice president and treasurer; and Clinton A. Pray, secretary. The directors are Messrs. Horton and Tucker, Joseph B. McIntyre, Frank L. Hinckley, Orrin G. Wood, Frank C. Nichols, and George M. Parks.

William Pearson, Boston, Mass., district manager of the Firestone Tire & Rubber Co., was the speaker at a recent dinner meeting at the Providence-Biltmore Hotel, attended by more than 100 southern New England dealers.

The Alling Rubber Co. has closed its retail store at 30 High St., Westerly, R. I.

Ernest I. Kilcup, credit manager, Davol Rubber Co., Providence, R. I., and vice president of the National Association of Credit Men was one of the principal speakers at the dinner meeting of the Rhode Island Association of Credit Men at the Providence-Biltmore Hotel. Mr. Kilcup belongs to the special committee of the United States Chamber of Commerce studying legislation affecting credit grantors, and his topic was bankruptcy.

Dominion Rubber Co., Ltd., Montreal, P. Q., Canada, according to Advertising Manager W. F. Bilger has installed apparatus to manufacture Lastex, the first in Canada to do so, and is adequately equipped to meet domestic demands.

The Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont., Canada, through C. S. Watson, manager, advertising department, has announced that C. H. Carlisle has resigned as general manager of the company, but will continue as president and will take a close and personal interest in the direction of its affairs. He retains also his invested interest. He is succeeded as general manager by R. C. Berkinshaw, who has been with Goodyear 14 years in various capacities, as general counsel, secretary, treasurer, and assistant to the president.

Rubber Industry in Europe

GREAT BRITAIN

United Kingdom Rulings

The Board of Trade of the United Kingdom announces that regulations have been made under Section 8 (1) of the Finance Act, 1919, and Paragraph 1 of the third schedule to the Import Duties Act, 1932, prescribing that certain classes of goods manufactured in and consigned from a part of the Empire must contain, effective April 1, 1933, a minimum of 50% of Empire material and labor to qualify for Imperial Preference, instead of 25%.

Included in the schedule are insulated electric wires and cables; telegraph, telephone, and wireless apparatus; boots, bootees, shoes, overshoes, slippers, and sandals of all descriptions and of whatever material, finished or unfinished, and shaped parts and laces therefor; aircraft and parts thereof; motor cars, including motor bicycles and motor tricycles, and accessories and component parts thereof; manufactures wholly or partly of rubber, balata, or gutta percha, including vulcanite and ebonite; appliances, apparatus, accessories, and requisites for sports, games, gymnastics, and athletics (other than apparel and footwear) and parts thereof; toys of all kinds and parts thereof of whatever material composed; fountain pens and parts; hair combs; and brooms and brushes of all descriptions and parts thereof (other than prepared bristles and other prepared animal hair).

Rubber Footwear Situation

Despite the protective tariff for the rubber footwear industry, in 2 years the price of rubber footwear has been reduced about 35%, according to Sir George Beharrel, of the Dunlop Rubber Co., Ltd. The first tariff on footwear was 10% imposed in March, 1932; toward the end of the following month an additional 10% was levied, and finally in October of the same year also an ad valorem duty of 2d. and 3d. per pair for shoes and boots respectively. But neither the reductions in price nor the duties have been sufficient to prevent large quantities of foreign rubber footwear, representing over 60% of local consumption, from being bought in Great Britain. There has always been competition in these articles, but whereas in earlier years most foreign footwear came from America and Canada, the main source is now Japan which has increased from nothing to nearly 6,000,000 pairs a year.

The Japanese product is of low quality and sold at prices far below any which could be met under British conditions. In the United States, said Sir George, a definitely prohibitive tariff against this kind of competition has been introduced. If such action is confined to one country, the result must be intensified competition in other countries where the tariff is less of a barrier.

He concluded his speech with the remark that it was his impression that the Japanese were following a deliberate policy, whether working to a 5-year plan or a plan of some other duration, of operating to capacity in various industries to flood the world's markets, utterly regardless of the economic position, and he emphasized that this situation is a subject for grave thought to those who desire to see healthy employment developed.

Rubber Industry Bill

A number of rubber manufacturing firms have submitted a petition against the Rubber Industry Bill, designed to help the Rubber Research Association. It is suggested in the petition that the Research Association may assume the character of a Government Department if made the subject of an Act of Parliament and may seek to fix specifications and standards. It is feared that the organization may come under control of a few of the larger firms. Then it is said no adequate safeguards are provided in the Bill for secrecy so that firms will hesitate to submit their problems to the Research Association for fear that their methods will be divulged to their competitors.

It is further claimed that the Bill has been introduced at the instance of a few personally interested in the continuation of the Association and that no general meeting of the India Rubber Manufacturers' Association was held to discuss the matter so that it would be a gross injustice to impose the obligations of the Bill on the industry without giving those engaged in it an opportunity to give their views.

The Research Association

In connection with the above it is worth mentioning the discussion of the work of the Rubber Research Association by J. R. Scott and T. R. Dawson at a February meeting in Birmingham of the Institution of the Rubber Industry. Mr. Scott spoke of the examinations of raw materials; the testing of proposed new materials; the lengthy fundamental researches on aging and on resistance of rubber to swelling in oils; the development of testing methods and especially of the new form of electrode for rubber, now adopted by the British Standards Institution and the American Society for Testing Materials; the work on tires, inner tubes, hot water bottles, etc., and the collaboration with large consumers.

Mr. Dawson gave an account of the Association's intelligence services. Inquiries are handled from members, government departments, organizations of all kinds, universities, business concerns, the press, and private individuals. The rubber library at Croydon is the largest in the world. It has over 20,000 publications on rubber, including books, journals, specifications, cuttings, maps, pictures, etc., covering every aspect of the industry and including publications in 18 different languages. It has many rare books and practically every scientific and technical work on rubber in every language since 1850. Every month is published a "Summary" with 600 to 700 abstracts of rubber literature, while in addition are issued circulars on special subjects.

British Notes

Gaisman Pedestrian Type Blocks, with concrete base and treads in attractive marbled effects, were seen at the stand of the Universal Rubber Paviors, Ltd., at the Birmingham Section of the British Industries Fair in February. This block, intended for foot and light vehicular traffic, may be used for interior purposes too and can be had in a variety of plain colors besides the marbled effects.

The Dunlop rubber road markers, rubber casings 12 inches long filled with concrete and embedded in the roads as desired, will be tested on the London to Brighton road at the Bolney Corner.

The Avon India Rubber Co. in some cases is using water instead of air in air bags for curing giant pneumatics. The tire receives a preliminary cure and then a final cure, a procedure which makes for better vulcanization, it is claimed. The company has produced some black molded tubes and plans to make all tubes like these for giant and bus balloons.

Redfern's Rubber Works, Hyde, Lancashire, reports profits of only £7,398 against £12,000 in 1931 and £30,247 in 1930. A dividend of 3¾% was paid on the ordinary shares instead of 7½% as in last year.

David Bridge & Co., Ltd., Castleton, near Manchester, will manufacture and sell rubber machinery of the National Rubber Machinery Co., Akron, O., U. S. A., from drawings and specifications by the American concern, for Great Britain, Ireland, Europe, and British Dominions except Canada.

France

Despite measures to restrict imports of various classes of rubber goods, statistics for the first half of 1932 show considerably increased entries of foreign footwear into France, 7,015 quintals against 2,963

quintals; rubberized fabrics, 1,852 against 959 quintals; sanitary goods, 1,296 against 1,065 quintals. Imports of tires and tubes, however, have been reduced effectively, but against this decrease is the fact that exports of pneumatic tires and tubes were only 42,873 against 54,042 quintals; solid tires, 7,823 against 8,595 quintals; cycle tires and tubes, 12,362 against 14,867 quintals; rubberized fabrics, 744 quintals against 2,974; goods of rubberized fabrics, 478 against 1,054 quintals; and ebonite goods, 429 against 1,059 quintals. Imports of crude rubber fell from 307,094 to 203,800 quintals, a decrease partly due to the large stocks of crude rubber on hand at factories on which they are now drawing.

The Société Industrielle du Caoutchouc Naturel has been formed to manufacture and deal in all kinds of rubber goods, to convert and sell all material, by-products or derivatives connected therewith, particularly liquid latex. Offices are at Paris. The capital has been fixed at 1,000,000 francs in 500-franc shares, and 800 of these have been distributed as remuneration to various parties, including the Kaysam Syndicate Ltd., London, England. Among the first directors is Mervyn Stutchbury, also of London.

Latvia

Measures to protect the home rubber footwear industry in Latvia have led to a complete cessation of imports of these goods; while the fact that the Waronis concern is making pneumatic tires caused a decline in tire imports from 190 tons for the first 9 months of 1930 to 122 tons for the corresponding period of 1932. Latvia's principal exports are footwear, which showed an increase as to quantity, but a decline in value in 1932 as against 1931, and a very sharp fall especially in value against 1930, as the following figures show: 1932, 352 tons, value 1,616,000 lati; 1931, 249 tons, value 1,711,000 lati; and 1930, 381 tons, value 4,035,000 lati.

Imports of crude rubber, 643 tons in the first 9 months of 1930, were only 187 tons in the same period of 1932.

Italy

The rubber industry is the most prosperous one in Italy today. Figures for the first half of 1932 show an increase in imports of crude rubber from 59,119 quintals in 1931 to 78,428 quintals in 1932. The value of imports of manufactured goods fell sharply from 50,400,000 lire to 30,400,000. Imports of fabric lined hose and belting increased, but all other goods declined; and Austria appears to have been the only country to increase its sales of rubber goods to Italy during the period under review. Exports also declined in value from 73,100,000 lire to 63,300,000 lire in 1932, but increases occurred in the quantities of exported hose, belting, thread, ebonite, pneumatic tires, and tubes. In the latter, business with Spain was particularly active.

GERMANY

Statistics for 1932

Statistics of Germany's rubber business in 1932 show that while exports and more especially imports of manufactures have dropped steeply, imports of crude rubber increased from 450,558 quintals in 1931 to 481,632 quintals in 1932, and at the same time reexports of crude rubber fell from 52,397 to 24,205 quintals. Imports of rubber manufactures have dwindled from 46,434 quintals, value 22,168,000 marks, to 21,827 quintals, value 8,427,000 marks.

The principal imports were tubes for motor vehicles, totaling 16,060 against 94,031 in 1931; cycle tubes, 325,387 against 83,216, but since 321,626 tubes of the 1932 total were returned goods, the actual imports did not even reach 4,000 in 1932; tire covers, 38,966 against 165,712. Footwear imports fell from 779,027 to 302,352 pairs; belting, hose, and packing amounted to 729 compared with 1,344 quintals; rubber thread, 1,337 against 3,492 quintals; hard rubber and hard rubber goods, 1,088 against 1,016 quintals.

Exports were rather better and totaled 149,759 quintals, value 57,021,000 marks, against 206,811 quintals, value 93,076,000 marks in 1931. Comparative figures for the main exports follow:

Exports		1931	1932
Rubber thread	*kgs.*	2,346	2,462
Automobile tubes	*no.*	141,736	105,155
Tubes for other vehicles	*no.*	2,887,834	660,728
Automobile tires	*no.*	190,871	146,269
Cycle tires	*no.*	1,005,800	743,885
Footwear	*prs.*	1,927,583	1,117,643
Packing	*quintals*	2,051	1,627
Hose	*quintals*	13,297	10,497
Belting	*quintals*	3,049	2,220
Rubber with fabric	*quintals*	18,114	13,479
Other soft rubber goods,	*quintals*	86,025	65,131
Hard rubber and goods,	*quintals*	11,629	8.535

Automobile Show

At the International Automobile and Motor Cycle Exhibition in Berlin on February 11 to 23, 1933, the exhibits of tire manufacturers reflected the interest in super-balloon tires and tires with special treads of anti-skid compounds. Tires in the first group shown by the Continental Gummiwerke A.G. were Aero super-balloons in 5 sizes, Aero-type tires to fit existing fellies, and Aero-type giant pneumatics for busses; the Deka Pneumatik G.m.b.H., so-called Giant-type super-balloons, and special small tires with internal pressure of 1 atmosphere, for wheelbarrows, etc.; Deutsche Dunlop, Magnos Ballon super balloon tires and Supra tires for existing fellies; also exhibiting were Harburger Gummiwarenfabrik Phoenix A.G., Englebert & Co., and Gummiwerk Fulda.

Among the special anti-skid tires were the T-tires (taxi-tires) by Continental, which have treads compounded with fine, sharp-edged particles of quartz to give the tread a surface that is at once rough and porous, thus enhancing the gripping power of the tires on slippery roads. The tread compound of the Deka-Asphalt tires includes coconut fibers, which are ripped out by driving, leaving evenly distributed pores on the surface of the tread that serve to act as a suction on the surface of the road.

Vorwerk, of Barmen, the only solid tire manufacturer represented, exhibited an oversize giant elastic tire with about double the rubber surfacing usual, and the Gollert hollow elastic tire.

In addition 2 new wheels for use on rail cars were on view. That shown by the Krupp A.G. has an interior rubber ring, and a thick rubber band replaces the usual steel felly; while the wheel flange is of steel. The Waggonfabrik Uerdingen exhibited an iron tired wheel, the felly of which is divided and takes up 2 rubber rings vulcanized on to metal plates fitted in grooves. The rubber rings encase an I-shaped ring that bears the felly, which is thus practically insulated from the wheel body. This wheel, it appears, has made possible the construction of the special rail cars seating 50 persons and having a total weight of only 5 tons, which the Uerdingen has built in cooperation with the Opel concern.

Two automobile manufacturers, Citroen and Horch, displayed cars with "floating power." Citroen adopts the American system, but Horch, a German process, the Flexosecur Getefo rubber motor bearing, devised by the Gesellschaft für technischen Fortschritte, Berlin W. 35.

Among novelties were included license number plates of rubber reenforced with metal and having raised rubber numbers, by Nesselhauf & Schroder, Berlin; rubber hair upholstery, by Hauenschild, of Hamburg; a rubber automobile hood holder and safety window channeling, by the Continental concern.

Sweden

Sweden's imports and exports of all rubber manufactures sharply declined for 1932 as compared with 1931. Imports of crude rubber, gutta percha, and balata, however, rose from 3,868,789 to 4,324,696 kilos. The chief imports of manufactured goods included in 1932 tires for automobiles and motorcycles, 1,267,263 against 1,936,225 kilos; inner tubes for motor vehicles and bicycles, 85,917 against 132,199 kilos; other parts for cycles, 171,770 against 308,877 kilos; other parts for motor vehicles, 167,093 against 287,227 kilos; soles and heels, 159,237 against 456,930 kilos; belting, 179,358 against 314,295; apparel, 31,764 against 70,450 kilos; and elastic bands, 58,684 against 105,145 kilos.

Among the exports were hard rubber blocks and sheets, 15,669 instead of 31,341 kilos; other sheets, packing, etc., 106,939 against 132,244 kilos; footwear, 629,334 against 920,136 kilos; and rubber soled footwear, 173,620 against 280,971 kilos. Figures for January, 1933, show further declines in all items except in rubber soled footwear, exports of which were up 10% as compared with January, 1932.

Rubber Industry in Far East

NETHERLANDS EAST INDIES

Rejuvenating Old Trees

In these days the rejuvenation of old areas is receiving much attention. Theoretically the simplest system would be to plant a row of young trees between 2 rows of old trees, then as the young trees reached the tapping stage, gradually remove the old trees. In practice, however, this plan does not work because the young plants do not thrive in the shade of the old trees. Whether this unsatisfactory growth is due to insufficient light or to root competition is a subject of much discussion. A. d'Angremond[1] believes that the lack of light causes imperfect functioning of the leaves and resultant undernourishment of the whole tree including the rootlets, which are thereby rendered incapable of successfully competing with other well-nourished roots.

Consequently the possibility was considered of artificially removing the adverse effect of malnutrition by having the young Hevea feed on the old trees, as it were, and it was first attempted to make budgrafts on thick roots of the old rubber trees, the idea being to develop a sturdy young plantation and to shorten the period between the felling of the old trees and tapping the young ones.

Van Helten has successfully made buddings on roots, and these root buddings in the Cultuurtuin at Buitenzorg are now vigorous trees. He had to cut through the root, however, to force the bud to sprout, thus severing connection between the tree and the budding, which of course was not d'Angremond's aim. His attempts at budding roots were unsuccessful. Incidentally he mentions that a planter, working independently and having no knowledge of these experiments, solved the difficulty of budding roots without separating them from the trees, by making deep incisions in the roots; then the buds sprouted, and eventually the roots healed.

In the end d'Angremond adopted an entirely different method. He laid bare sections of suitable thick roots, bored perpendicular holes through them, and after the latex that flowed from the wounds had dried and been removed, inserted stumps in these holes. Then the upper edge was sealed with wax and the underside left untouched to permit the wound secretion to drain off. Finally the earth was carefully put back. These experiments were made in March, 1931, and when a year later the plants were dug up, it was found that the stump and root had grown together and that union was perfect. It is too early to conclude whether this method of semiparasitism will solve the problem of improving the vitality of young Heveas growing in the shade; nevertheless d'Angremond finds that there are indications of a definite reaction.

Synthetic Rubber

The local press takes over a thoughtful article by A. van Rossem on the question of synthetic rubber. It is realized that synthetic rubber will most probably never be able to compete with plantation rubber in regard to price. But investigators in Europe and America will continue to work on the problem, first, to afford manufacturers an effective means of checking any tendency of plantation rubber to rise too high in price, and second, to provide a substitute for an indispensable raw material, supplies of which might be cut off or seriously curtailed in the event of war. A period of high prices as was experienced in 1925-26 would immediately lead to a considerable expansion in the synthetic rubber industry, says van Rossem, who points to the impetus given the American reclaim industry by the high prices of the last boom; much therefore depends upon the rubber grower.

On the other hand synthetic rubber may do the rubber industry much good by giving rise to special rubber products with hitherto unknown qualities while at the same time helping to stabilize the price at a level, low yet sufficiently profitable to rubber growers.

Remilling Native Rubber

While the exports of native rubber during the first half of 1932 were considerably less against preceding years, the figures for the last half indicate a marked rise which brings the monthly figures toward the end of the year much closer to the average monthly shipments for 1930 and 1931, as the following preliminary figures show:

1932	Tons
January	6,305
February	4,533
March	4,440
April	3,334
May	4,260
June	3,858
July	4,321
August	5,615
September	5,584
October	6,925
November	6,846
December	6,704
Total 1932	62,725
Total 1931	89,399
Total 1930	90,496

Monthly average for 1931 and 1930, 7,500 tons.

In a recent article[2] W. Spoon points out that the remarkable part of the matter is that despite the lower price for rubber, this increased output, in the form of milled crepe, finds a ready market at a price but little below that for standard sheet and that even this difference has gradually become smaller. Thus in the beginning of 1930, when standard sheet was quoted at 39¾ guilder cents per half kg. at Batavia, medium blanket fetched 34¼ guilder cents at Singapore, a difference of 5½ cents. At the end of 1930 and the beginning of 1931 the respective prices were 21½ and 18¾ cents, a difference of 2¾ cents, and at the end of 1931, 10½ and 9¼ cents, a difference of only 1¼ cents. As the price of rubber dropped, this difference tended to diminish, reaching a minimum of ¼-cent. Since August, 1932, however, the difference has returned to the level at the end of 1931, that is 1¼ cents. (Guilder, 100 cents = $0.402 U. S. equivalent.)

The remilled rubber was formerly marketed in 5 different grades ranging from a pale blanket, only a little darker than normal estate crepe, to a blackish, rather soft, and somewhat sticky blanket. Today only 3 qualities are quoted: the dark brown C blanket, dark brown so-called remilled crepe, and the black bark crepe.

The remilling industry in the Dutch Indies, which in 1931 comprised 30 factories with annual capacity of 49,365 tons, of which 24 factories were actually operating and produced 20,838 tons, fell off considerably in 1932. The same is true for Singapore, where only 5 factories with a total monthly capacity of 6,000 tons are in operation whereas, at the end of 1930, 22 out of a total 35 factories were still working.

However the business has been simplified, and the increased shipments suggest that even if the remilling industry is down, it is by no means out.

N. E. I. Notes

Two investigators from the A.V.R.O.S. Experiment Station, Medan, J. F. Schmole and H. N. Blommendaal, are at present in Malaya collecting data concerning costs on estates and in the factories. This trip has been undertaken as a result of the opinion frequently expressed of late, that production costs of rubber are lower in Malaya than in East Coast Sumatra.

At the same time a scientist from the Rubber Research Institute, Kuala Lumpur, is in Deli studying problems of interest to planters in Malaya. "The susceptibility to brown bast of the various families becomes more pronounced year by year," says C. Heusser in his report[3] on the yields of seedlings from the 1920 crosses in the Soengei Pantjoer Experimental Garden, during 1931. On the other hand he shows that seedlings 33 by 33 from the isolated seed gardens so far show no sign of brown bast although the Clone Av. 33 seemed very susceptible to this disease.

[1] *Arch. Rubbercultuur*, Dec., 1932, pp. 357-63.
[2] *Indische Mercuur*, Mar. 8, 1933.
[3] *Arch. Rubbercultuur*, Dec., 1932, pp. 378-91.

MALAYA

Planting Statistics

The February *Bulletin of the Rubber Growers' Association* includes several detailed tables regarding areas and outputs of plantation rubber throughout the East. The world's area planted to rubber at the end of 1931 was 7,955,000 acres, of which 5,580,000 acres are mature and 2,375,000 acres immature. This area is practically evenly divided between large estates and small holdings, the former covering 4,221,000 acres and the latter 3,734,000 acres, or 53.1% and 46.9% of the total respectively. Actually the line of demarcation between large and small estates is not clean cut since the definition of large estates varies in the different countries, but the figures serve to indicate broadly the distribution as between the European and native systems of cultivation.

Among the individual countries the planted areas of the 2 chief rubber producing centers, Malaya and the Dutch Indies, which between them have 79.5% of the total rubber area, approach each other much more nearly than has usually been supposed to be the case. In fact, accepting Mr. Whitford's figures for native rubber in the Dutch colonies, which have been used in this case, we see that 3,254,000 acres, the total area planted to rubber in the Dutch colonies is actually larger than 3,073,000 acres, the total for Malaya. Of the Dutch total the greater part, 1,815,000 acres consists of small holdings; while large estates cover 1,439,000 acres, whereas in Malaya the position is reversed: 1,853,000 acres are large estates and 1,220,000 acres small holdings.

If the output from Malaya is nevertheless so much greater than that of the Dutch Indies (for 1932 it is put at 415,400 tons against 211,000 tons in the Dutch Indies), this is due first to the great drop in the exports of native rubber and second to the fact that the mature area on Dutch estates is only about ⅔ that of Malaya, that is 945,000 against 1,442,000 acres. The mature area on Malayan small holdings is 1,011,000 acres and for the Dutch colonies, 1,155,000 acres.

The figures for Ceylon acreages indicate that the total planted area is about 7% of the world's total, or 546,000 acres, most of which is mature; while 362,000 acres are large estates. India and Burma together have a planted area of 183,000 acres, 133,000 mature; British Borneo, 394,000 acres, 183,000 mature; French Indo-China, 280,000 acres, 102,000 mature; Siam, 150,000 acres, 45,000 mature; and other countries, 75,000 acres, 64,000 mature.

When the planted areas at the end of 1931 are compared with those planted before 1911, we notice that the greatest expansion in the interim has taken place in the Dutch Indies where the acreage increased from 279,000 before 1911 to 3,254,000 acres in 1931; next comes Malaya with 541,000 acres increased to 3,073,000 acres; Ceylon, not far behind the Dutch colonies in 1911 with 219,000 acres, has progressed comparatively slowly to its present 546,000 acres. On the other hand Indo-China's spurt from 9,000 acres in 1911 to 280,000 acres is worth noting, particularly in view of the fact that it is also the only country whose rubber industry is being subsidized by the government.

The area out of tapping in Malaya at the end of 1932 was 315,000 acres, or 22% of the tappable area; in the Dutch Indies 220,000 acres in November, 1932, or 23% of the mature area; but the area out of tapping had little effect on the Malayan output, which over the entire year was about equal to that of 1931; whereas in the Dutch Indies it caused a drop of 8% in output in the first 11 months of 1932 as compared with the corresponding period of 1931.

The world output of plantation rubber in 1932 is put at 709,500 tons distributed as follows:

Country	Tons
Malaya	415,400
Ceylon	49,000
Dutch East Indies	211,000
India and Burma	3,500
British North Borneo	5,000
Sarawak	7,000
French Indo-China	14,500
Other countries	4,100
Total	709,500

From this table, in which outputs are distributed not only according to countries, but also according to the nationality of the producers, the striking fact emerges that of the total of 449,460 tons of estate rubber, 270,660 tons were produced by those of British nationality, and only 58,000 tons by Dutch nationals. Other Europeans produced 36,200 tons; Americans 32,600 tons; while Asiatic estates, as distinguished from native holdings, produced 52,000 tons. In the Netherlands East Indies itself 46,000 tons of estate rubber came from British owned estates.

Malayan Notes

It has officially been announced that the governments of the Straits Settlements, Federated Malay States, and Johore have decided to repeat for the year 1933 the temporary waiver of all current rent due on lands in excess of $2 an acre, on conditions similar to those governing during 1932.

For a period of 6 months only, beginning from February 1, 1933, the cess levied on rubber exports to provide funds for the Rubber Research Institute of Malaya will be reduced from 10 to 8¢ (Straits currency), per picul.

Announcement is made of the amalgamation of the Vallambrosa and the Sungei Kapar companies, the former of which was formed in 1904 and the latter in 1906. Since 1931 the estates of the companies had been worked under a system of joint management under the supervision of the general manager of Vallambrosa. This arrangement, favored by the fact that the mature areas of the concerns are situated close to each other in Klang, led to substantial economies. By making the arrangement permanent, further economies will be made possible, also in administration costs in England.

The Wilkinson Process Rubber Co., Ltd., reports a net loss of $38,700 for the year ended September 30, 1932. This brings the total debit to $432,595. Owing to the depression in that country, the company is no longer represented in the United States.

The Langen (Java) Rubber Estates Co. has been experimenting with tapping every third day, recently stated the chairman, Eric Miller, and it was found that the method effected considerable economies. A Langen tapper, it is said, now brings in daily 3 times the weight of rubber that any native small-holder can from his holding. The success of this method has led to experimentation with tapping every fourth day.

OBITUARY

(*Continued from page 47*)

displayed during all his life, enable him to work up the initially small plant to a very large firm, the products of which are sold nearly all over the world. He was for many years the chairman of the Rubber Manufacturers' Association of Belgium and vice chairman of the Car Manufacturers' Association.

He is survived by his son, Georges, who becomes manager of the company, and by a daughter.

Expert on Planting

THE rubber industry has lost an interesting and well-known member in Lt.-Col. J. C. G. Kunhardt who died on February 9, 1933.

Col. Kunhardt was born in 1875 in South Africa, took up medicine in London, and in 1902 joined the Indian Medical Service. Later on, as a member of the Indian Plague Research Commission, he did valuable work in plague prevention, and his numerous papers on the subject were published in the *Indian Journal of Medical Research* and other journals. He had a flair for statistics; some years before he retired from the Indian Medical Service, he began his statistical investigation of the rubber industry, and after his retirement from the service devoted himself more completely to this study. He also made trips to Malaya for first hand information.

He first attracted the attention of the rubber world when in the slump of 1921 he published a booklet, "An Analysis of the Statistical Position of Rubber," in which he attempted to show that a shortage of rubber would result from increased consumption by various industries in future years. In 1930 he wrote a pamphlet, "The Future of Rubber," issued by the rubber shareholders' section of the Institution of the Rubber Industry, which was substantially a warning on the subject of the exhaustion of the older areas.

Patents and Trade Marks

MACHINERY

United States

1,895,603 and 1,895,604. **Tire Molding Press.** J. W. Brundage, assignor to Summit Mold & Machine Co., both of Akron, O.

1,895,727. **Recording Instrument Fountain Pen.** W. H. Pearce, Churchville, assignor to Brown Instrument Co., Philadelphia, both in Pa.

1,895,852. **Slitting Device.** R. McC. Johnstone, Short Hills, N. J., assignor to Cameron Machine Co., Brooklyn, N. Y.

1,895,909. **Molded Article Remover.** E. Blaker, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,895,921. **Shoe Roller and Presser.** H. G. Ellis, Waltham, Mass., assignor to B. F. Goodrich Co., New York, N. Y.

1,895,922. **Belt Making Apparatus.** B. A. Evans and W. B. Freeman, both of Cuyahoga Falls, O., assignors to B. F. Goodrich Co., New York, N. Y.

1,895,941. **Shoe Pressing Apparatus.** R. V. Ritchey, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,895,943. **Molded Tire Remover.** J. P. Sapp, Kent, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,896,214. **Adjustable Tire Core.** H. C. Bostwick, assignor to Akron Standard Mold Co., both of Akron, O.

1,896,280. **Collapsible Drum.** H. C. Bostwick, assignor to Akron Standard Mold Co., both of Akron, O.

1,896,372. **Battery Box Mold.** O. O. Rieser, Oak Park, Ill., assignor to Richardson Co., Lockland, O.

1,896,880. **Demonstrating Device.** R. W. Brown, assignor to Firestone Tire & Rubber Co., both of Akron, O.

1,897,025. **Hollow Article Mold.** S. L. Palmer, Teaneck, N. J.

1,897,105. **Sole Cementing Machine.** M. H. Ballard, Beverly, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.

1,897,401. **Centrifugal Molding Device.** W. R. Seigle, Mamaroneck, assignor to Johns-Manville Corp., New York, both in N. Y.

1,897,425. **Tire Cutter.** W. G. Fritts, Lexington, N. C.

1,897,479. **Fibrous Sheet Material Device.** E. Hopkinson, New York, N. Y., assignor to Naugatuck Chemical Co., Naugatuck, Conn.

1,897,690. **Tire Shaper and Airbag Inserter.** B. De Mattia, Passaic, N. J., assignor to Goodyear Tire & Rubber Co., a corp. of O.

1,897,893. **Stamp Mold.** R. Evans, Highland Park, Ill.

1,897,961. **Rubber Compound Treating Machine.** R. W. Snyder, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

1,898,031. **Band Saw Wheel Tire Apparatus.** A. G. Carter, assignor to Carter Products Co., Inc., both of Grand Rapids, Mich.

1,898,043. **Rubber Article Form.** B. H. Foster, Maplewood, N. J., assignor to Morgan & Wright, Detroit, Mich.

1,898,235. **Vulcanizer Repairing Element.** R. H. M. L. Binay, Paris, assignor to Office General des Specialites Automobiles, Seine, both in France.

1,898,604. **Latex Concentrating Apparatus.** D. F. Twiss and E. A. Murphy, assignors to Dunlop Rubber Co., Ltd., all of Birmingham, England.

1,898,667. **Collapsible Core.** F. L. Johnson, Akron, O.

1,899,211. **Vulcanizer.** F. J. Shook, assignor, by mesne assignments, to National Rubber Machinery Co., both of Akron, O.

1,899,258. **Interchangeable Matrix Mold.** A. A. Bush, assignor to Firestone Tire & Rubber Co., both of Akron, O.

1,899,393. **V-Belt Mold.** E. Meyer, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,899,427. **Buffing Apparatus.** D. K. Singer, Hartford, Conn., assignor to B. F. Goodrich Co., New York, N. Y.

1,899,521. **Vulcanite Denture Mold.** U. Nudell, New York, N. Y., assignor to Baker & Co., Inc., Newark, N. J.

1,899,524. **Jar Cap Gasket Former and Applier.** M. G. Parks, Gary, Ind.

1,899,747. **Heel Trimmer.** M. S. Cate, Waltham, Mass., assignor, by mesne assignments, to Hood Rubber Co., Inc., Wilmington, Del.

1,899,754. **Pac-Type Boot Mold.** A. A. Glidden and T. M. Knowland, both of Watertown, Mass., assignors, by mesne assignments, to Hood Rubber Co., Inc., Wilmington, Del.

1,899,907. **Balanced Molding Apparatus.** P. E. Young, Fairhaven, Mass., assignor to Acushnet Process Co., a corp. of Mass.

Dominion of Canada

329,979. **Dental Mold.** H. Thompson, Toronto, Ont.

United Kingdom

382,397. **Rubber Thread Cutter.** Dunlop Rubber Co., Ltd., London, and H. Willshaw and F. G. Broadbent, both of Ft. Dunlop.

382,468. **Tire Fabric Cutter.** Dunlop Rubber Co., Ltd., London.

383,038. **Rubber Cutter.** Dunlop Rubber Co., Ltd., London, and H. Willshaw and F. G. Broadbent, both of Ft. Dunlop.

Germany

571,381. **Automatic Strip Cutter.** Deutsche Dunlop Gummi Co. A.G., Hanau, a. M.

PROCESS

United States

*18,734. **Latex-Coated Article.** A. P. Cramer-Van Deventer, Chesieres, Switzerland.

1,895,738. **Hard and Soft Rubber Article.** C. Shugg and P. Robinson, both of North Adams, assignors to Sprague Specialties Co., Quincy, all in Mass.

1,895,927. **Electric Cable.** C. O. Hull, Stratford, Conn., assignor to General Electric Co., a corp. of N. Y.

1,896,263. **Rubber Coated Article.** P. H. Watkins, assignor to Naugatuck Chemical Co., both of Naugatuck, Conn.

1,896,574. **Nonskid Tire.** E. W. Covey, Big Moose, N. Y.

1,896,868. **Snap Fastener.** A. W. Kimbell, Newton Center, assignor to United-Carr Fastener Corp., Cambridge, both in Mass.

1,897,149. **Mold Joining.** C. M. Saeger, Jr., Bowmanstown, Pa.

1,897,240. **Separating Liquids of Different Specific Gravities.** S. A. B. Dahlgren, Alsten, Sweden, assignor to De Laval Separator Co., New York, N. Y.

1,897,626. **Hard Rubber Article.** A. H. Voss, La Grange, Ill., assignor to Western Electric Co., Inc., New York, N. Y.

1,898,033. **Shoe.** A. Cohn, St. Louis, Mo.

1,898,515. **Colored Plastic Material.** A. Albright, 3rd, Maplewood, assignor to Rubber & Celluloid Products Co., Newark, both in N. J.

1,898,731. **Dental Model.** L. Köhler, Cologne a. Rhine, assignor to I. G. Farbenindustrie A. G., Frankfurt a. M., both in Germany.

1,898,886. **Fabricating Tires.** R. C. Murphy, Grand Rapids, Mich.

1,898,985. **Rubber Bonded Asbestos.** R. M. Day, assignor to Dewey & Almy Chemical Co., both of Cambridge, Mass.

1,899,016. **Dehydrating Rubber Deposited from Aqueous Dispersions.** E. H. Darby, deceased, by C. L. Darby, executrix, both of Rome, assignor to American Anode, Inc., New York, all in N. Y.

1,899,067. **Spliced Rubber Sheets.** H. L. Trumbull, Hudson, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,899,088. **Tire Bead.** W. C. Geer, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,899,243. **Dispersing Rubber in Water.** E. B. Newton, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,899,676. **Repairing Tire Casings.** J. J. Dettling, assignor to General Tire & Rubber Co., both of Akron, O.

Germany

569,803. **Seamless Rubber Goods.** Dunlop Rubber Co., Ltd., London, England, and Anode Rubber Co., Ltd., St. Peter's Port, Guernsey. Represented by R. and M. M. Wirth, C. Weihe, and H. Weil, all of Frankfurt, a. M., and T. R. Koehnhorn, Berlin.

570,179. **Suction Depression on Rubber Sheets.** L. Mischke, Grosz Jestin, Bez., Koslin.

570,701. **Latex Objects.** Societa Ital-

---
* Reissue.

iana Pirelli, Milan, Italy. Represented by A. Bursch and R. Gutmann, both of Berlin.
570,979. **Dumbbell Perforations in Rubber Sheet.** A.G., Chemischer Werte, Berlin.

CHEMICAL

United States

1,895,910. **Rubber Composition.** A. E. Boss, Fairlawn, O., assignor to B. F. Goodrich Co., New York, N. Y.
1,895,945. **Accelerator.** W. L. Semon, Cuyahoga Falls, and A. W. Sloan, Akron, both in O., assignors to B. F. Goodrich Co., New York, N. Y.
1,896,054. **Latex Coagulation.** S. B. Neiley, Winchester, assignor to Dewey & Almy Chemical Co., Cambridge, both in Mass.
1,896,335. **Brake Lining Composition.** A. T. K. Tseng, assignor to Beach Laboratories, Inc., both of Detroit, Mich.
1,896,491. **Aqueous Dispersions.** M. Luther, Mannheim, and C. Heuck, Ludwigshafen a. Rhine, assignors to I. G. Farbenindustrie A. G., Frankfurt a. M., all in Germany.
1,896,493. **Artificial Rubber.** H. Meis, Wiesdorf a. Rhine, and W. Klein and E. Tschunkur, both of Cologne-Mulheim, assignors to I. G. Farbenindustrie A. G., Frankfurt a. M., all in Germany.
1,896,535. **Accelerator.** O. Behrend, Nitro, W. Va., assignor to Rubber Service Laboratories Co., Akron, O.
1,896,544. **Antioxidant.** J. R. Ingram, Nitro, W. Va., assignor to Rubber Service Laboratories Co., Akron, O.
1,896,611. **Tire Puncture Preventive.** R. Cross, assignor to Silica Products Co., both of Kansas City, Mo.
1,896,659. **Rubber Composition.** A. F. Bigger, assignor to Rubber Process Corp., both of New York, N. Y.
1,896,660. **Devulcanizing Rubber.** A. F. Bigger, New York, N. Y., and A. C. Squires, Newark, N. J., assignors to Rubber Process Corp., New York, N. Y.
1,897,034. **Dental Impression Material.** L. E. Harrison, Tujunga, and S. E. Noyes, Los Angeles, assignors, by mesne assignments, to S. E. Noyes, Los Angeles, all in Calif.
1,897,129. **Coloring Rubber.** R. Krech, Mannheim, W. Scheurer, Ludwigshafen a. Rhine, and A. Koch, Hochst a. M., all in Germany, assignors to General Aniline Works, Inc., New York, N. Y.
1,897,133. **Factice.** M. Luther, Mannheim, and H. Beller, Ludwigshafen a. Rhine, assignors to I. G. Farbenindustrie A. G., Frankfurt a. M., all in Germany.
1,897,189. **Vulcanized Latex.** J. B. Crockett, Malden, Mass.
1,897,210. **Accelerator.** C. O. North, assignor to Rubber Service Laboratories Co., both of Akron, O.
1,897,220. **Accelerator.** W. P. TER Horst, Nitro, W. Va., assignor to Rubber Service Laboratories Co., Akron, O.
1,898,268. **Accelerator.** R. L. Sibley, Nitro, W. Va., assignor to Rubber Service Laboratories Co., Akron, O.
1,899,058. **Antiager.** M. C. Reed, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
1,899,120. **Antiager.** A. W. Sloan, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
1,899,426. **Antioxidant.** W. Scott, Nitro, W. Va., assignor to Rubber Service Laboratories Co., Akron, O.
1,899,535. **Rubberizing Composition.** M. C. Teague, Jackson Heights, assignor to General Rubber Co., New York, both in N. Y.
1,899,554. **Accelerator.** W. S. Calcott and W. A. Douglass, both of Penns Grove, N. J., and O. M. Hayden, Wilmington, Del., assignors to E. I. du Pont de Nemours & Co., Wilmington, Del.

Dominion of Canada

329,838. **Antiager.** Goodyear Tire & Rubber Co., assignee of A. M. Clifford, both of Akron, O., U. S. A.
329,839. **Antiager.** Goodyear Tire & Rubber Co., assignee of W. M. Lauter, both of Akron, O., U. S. A.
329,873. **Accelerator.** Rubber Service Laboratories Co., Akron, O., assignee of G. L. Magoun, Nitro, W. Va., both in the U. S. A.
329,874. **Accelerator.** Rubber Service Laboratories Co., Akron, O., assignee of R. L. Sibley, Nitro, W. Va., both in the U. S. A.
330,015 and 330,016. **Aqueous Rubber Dispersion.** Flintkote Corp., Boston, Mass., assignee of H. L. Levin, Rutherford, N. J., both in the U. S. A.

United Kingdom

383,432. **Fabric Coating Composition.** Dunlop Rubber Co., Ltd., London, Anode Rubber Co., Ltd., St. Peter's Port, Channel Islands, and G. W. Trobridge, Ft. Dunlop.

Germany

569,981. **Accelerating Vulcanization.** I. G. Farbenindustrie, A.G., Frankfurt. a. M.
570,567. **Electro-deposition of Rubber.** W. A. Williams, Edinburgh, Scotland. Represented by R. David, Berlin.
570,980. **Rubberlike Polymerisates.** I. G. Farbenindustrie, A.G., Frankfurt, a. M.
571,133. **Rubber Conversion Products.** B. F. Goodrich Co., New York, N. Y., U. S. A. Represented by G. Benjamin, Berlin-Charlottenburg.
571,177. **Rubber Coverings on Impervious Rigid Surfaces.** Dunlop Rubber Co., Ltd., London, England. Represented by W. Karsten and C. Wiegand, both of Berlin.
571,402. **Compounded Dental Rubber.** A. Sulke, Hannover.
571,470. **Aqueous Rubber Dispersions.** Flintkote Corp., Boston, Mass., U. S. A. Represented by H. Mortensen, Berlin.

GENERAL

United States

*18,749. **Hair Waver.** R. D'Orléans, assignor to W. H. H. Davis, both of San Francisco, Calif.
1,895,449. **Tire Valve Mechanism.** J. C. Crowley, Cleveland Heights, assignor to Dill Mfg. Co., Cleveland, both in O.
1,895,450. **Tire Valve Stem.** J. C. Crowley, Cleveland Heights, assignor to Dill Mfg. Co., Cleveland, O.
1,895,579. **Wheel Cushion Assembly.** A. L. Lussier, Springfield, Mass.
1,895,582. **Tubeless Pneumatic Tire.** F. A. Millican, Vancouver, B. C., Canada.
1,895,611. **Building Block.** J. H. Doak, Seaside, Ore.
1,895,645. **Matrix Cleaner.** O. Rostock and J. Claussen, both of Elmshorn, Germany.
1,895,663. **Oscillating Joint.** C. L. Humphrey, Detroit, and R. K. Lee, Highland Park, assignors to Chrysler Corp., Detroit, all in Mich.
1,895,731. **Ironing Board Pad.** A. H. Prenzel, Halifax, Pa.
1,895,850. **Fountain Pen.** J. Holtzman, New York, assignor of ½ to M. D. Ordmann, Brooklyn, both in New York.
1,895,898. **Flameproof Cable.** W. C. Robinson, Sewickley, Pa., assignor to National Electric Products Corp., New York, N. Y.
1,895,936. **Shaft Bearing.** A. B. Merrill, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
1,895,986. **Pedal Pad.** F. C. Grant, Harvey, Ill.
1,896,204. **Faucet Nozzle Antisplasher.** C. A. Schacht, Huntington, Ind.
1,896,321. **Milking Machine Teatcup.** R. E. Maes, Beloit, Wis.
1,896,475. **Electric Conductor.** E. L. Andrew, Rome, assignor to General Cable Corp., New York, both in N. Y.
1,896,561. **Knee Pad.** W. J. Ruth, Toronto, Ont., Canada.
1,896,617. **Hair Curler.** A. Goodman, Brooklyn, N. Y., assignor to Emeth Financial Corp., a corp. of N. Y.
1,896,641. **Road Marker.** J. R. O'Brien, Chicago, Ill., assignor, by mesne assignments, to Rubber Products Corp., Dover, Del.
1,896,708. **Tire Valve.** D. E. Jones, assignor of ½ to H. A. Gassaway, both of Seminole, Okla.
1,896,711. **Digger Chain.** E. H. Lichtenberg, assignor to Koehring Co., both of Milwaukee, Wis.
1,896,715. **Automobile Lifting Jack.** C. D. Martinetti, Orange, N. J.
1,896,783. **Elastic Fabric.** T. F. Moore, assignor to George C. Moore Co., both of Westerly, R. I.
1,896,797. **Running Board.** A. H. Leamy, Auburn, Ind., assignor to Manning & Co., Chicago, Ill.
1,896,908. **Cushioning Device.** R. J. Loock, Baltimore, Md.
1,896,920. **Street Marker.** P. Shapiro, New York, N. Y.
1,896,962. **Vibration Damper.** R. K. Lee, Highland Park, assignor to Chrysler Corp., Detroit, both in Mich.
1,896,968. **Clutch.** C. R. Paton, assignor to Studebaker Corp., both of South Bend, Ind.
1,896,969. **Vibration Dampener.** C. R. Paton, Birmingham, Mich., assignor to Studebaker Corp., South Bend, Ind.
1,897,028. **Tire Repair Plug.** W. M. Anderson, Minneapolis, Minn., assignor, by mesne assignments, to Kex Co., Inc., St. Louis, Mo.
1,897,146. **Head Band.** W. Richardson, Flushing, N. Y.
1,897,148. **Transfer Blanket.** G. S. Rowell, Cleveland, O., assignor to Multigraph Co., Wilmington, Del.
1,897,287 and 1,897,288. **Central Buffing and Drawgear.** R. L. Whitmore, London, England.

* Reissue.

1,897,423. **Prophylactic Device.** F. Ferri, Milan, Italy.
1,897,734. **Necktie Retainer.** A. Rossner, New York, N. Y.
1,897,801. **Court Marking Tape.** R. Healy, New York, N. Y.
1,897,806. **Pivot Joint.** A. J. Jansson, Flint, assignor to General Motors Corp., Detroit, both in Mich.
1,897,807. **Spring Mounting.** W. D. Kessler, Flint, assignor to General Motors Corp., Detroit, both in Mich.
1,897,914. **Doll Joint.** E. G. Schaeffer, Brooklyn, assignor to American Character Doll Co., Inc., New York, both in N. Y.
1,897,915. **Rubber Stamp.** A. W. Schmidt, Spring Valley, N. Y.
1,897,927. **Blow-Out Patch.** C. A. Domzalski, Detroit, Mich.
1,897,946. **Rumble Seat Canopy.** S. W. Harvey, New Haven, Conn.
1,897,949. **Airbag Connection.** R. C. Bateman, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
1,897,972. **Garment Stretcher.** L. S. Stripling, assignor, by mesne assignments, to National Garment Stretcher Corp., both of Amarillo, Tex.
1,897,974. **Interchangeable Tire.** G. Wolf, Bratislava, Czechoslovakia.
1,898,015. **Raincoat.** R. K. Leavitt, Greenburgh, N. Y.
1,898,064. **Spark Plug Insulator.** W. F. Ridge, Akron, O.
1,898,225. **Shoe Lace.** L. G. Szabo, Franklin, N. J.
1,898,272. **Bathtub Back Rest.** M. Stern, Philadelphia, Pa.
1,898,342. **Container.** W. R. Cuthbert, assignor to W. A. Sheaffer Pen Co., both of Ft. Madison, Iowa.
1,898,362. **Printing Device.** W. T. Gollwitzer, Chicago, Ill., assignor to Addressograph Co., Wilmington, Del.
1,898,425. **Surfacing Material.** R. Cowen and A. D. Jordan, assignors to Appleton Rubber Co., all of Franklin, Mass.
1,898,600. **Football.** M. Scudder, Clayton, assignor to Rawlings Mfg. Co., St. Louis, both in Mo.
1,898,658. **Stopper Plug.** O. Fitterer, Milwaukee, Wis.
1,898,690 and 1,898,747. **Dish Scraper.** C. A. Schacht, Huntington, Ind.
1,898,899. **Fire Extinguisher Valve.** A. C. Rowley, Drexel Hill, assignor to Globe Automatic Sprinkler Co., Philadelphia, both in Pa.
1,898,954. **Bathing Cap.** E. P. Gustafson, Forestville, assignor of 1/4 to J. P. Clary, Hartford, both in Conn.
1,899,092. **Bunion Corrective Device.** M. M. Hogan, Binghamton, N. Y.
1,899,093. **Heel.** B. Kind, Baltimore, Md.
1,899,242. **Toothbrush Holder.** A. McNab, Bridgeport, Conn.
1,899,293. **Vibration Insulator.** I. W. Robertson, assignor to Firestone Tire & Rubber Co., both of Akron, O.
1,899,299. **Pump.** J. S. Abercrombie, J. A. Tennant, and H. Allen, all of Houston, assignors, by direct and mesne assignments, to Stephens Pump Co., Round Rock, all in Tex.
1,899,373. **Truss.** C. A. Warburton, Exeter, N. H.
1,899,413. **Acid Vat.** H. E. Fritz, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
1,899,415. **Sink Strainer Feet.** G. C. Guckes, Lakewood, O.
1,899,421. **Display Card.** J. E. More, San Francisco, Calif.
1,899,471. **Horse's Boot.** V. Meyer, Brooklyn, N. Y.
1,899,545. **Windshield Wiper.** H. Willis, Bangor, assignor to Willis Wiper Co., Ltd., Belfast, both of Northern Ireland.
1,899,624. **Vehicle Spring Mounting.** E. S. MacPherson, assignor to Hupp Motor Car Corp., both of Detroit, Mich.
1,899,696. **Bathing Receptacle.** J. M. Karnofsky and J. E. Freedman, both of Waterbury, Conn.
1,899,782. **Bottle Cap Facing.** A. H. Warth, Baltimore, Md., assignor to Crown Cork & Seal Co., Inc., New York, N. Y.
1,899,783 and 1,899,784. **Bottle Cap.** A. H. Warth, assignor to Crown Cork & Seal Co., Inc., both of Baltimore, Md.
1,899,821. **Container Closure.** C. J. Parker, assignor to Crown Cork & Seal Co., Inc., both of Baltimore, Md.
1,899,871. **Rubber Stamp Stem.** F. L. Lake, Dallas, Tex.

Dominion of Canada

329,829. **Garment Supporter.** Elasto Ribbon Co., Inc., assignee of G. J. Lyons, both of New York, N. Y., U. S. A.
330,068. **Surgical Wrapping.** Surgical Dressings, Inc., Boston, assignee of S. Rosenblatt, Brighton, both in Mass., U. S. A.

United Kingdom

381,687. **Universal Joint.** F. B. Dehn, London. (Thompson Products, Inc., Cleveland, O., U. S. A.)
381,828. **Resilient Joint.** Budd Wheel Co., assignee of J. P. Tarbox, both of Philadelphia, Pa., U. S. A.
382,017. **Resilient Vehicle Mounting.** Armstrong Siddeley Motors, Ltd., Coventry, and H. Faulkner, Warwickshire.
382,155. **Firearm Shoulder Support.** Ceskoslovenska Zbrojovka Akciova Spolecnost V Brne and K. Staller both of Brunn, Czechoslovakia.
382,354. **Rope.** A. Robertson, Aberdeen.
382,582. **Airtight Joint.** British Thomson-Houston Co., Ltd., London, assignee of C. Steenstrup, Schenectady, N. Y., U. S. A.
382,726. **Aircraft Mooring Buoy.** A. and F. S. Short (representatives of A. E. Short), and H. O. Short, all of Kent.
382,763. **Vehicle Shock Absorber.** A. E. Newton, Kent.
382,919. **Portable Electric Lamp.** C. Kaiser, Heilbronn-on-Neckar, Germany.
382,944. **Hot Water Bottle Holder.** Faultless Rubber Co., assignee of T. W. Miller and A. D. Greene, all of Ashland, O., U. S. A.
382,983. **Resilient Joint.** F. G. G. Armstrong, Yorkshire.
383,026. **Stocking.** Hemphill Co., Central Falls, assignee of R. H. Lawson, Pawtucket, and R. F. Lovell, Providence, all in R. I., U. S. A.
383,210. **Picnic Box.** J. W. Panting, Middlesex.
383,279. **Hot Water Bottle Holder.** Faultless Rubber Co., assignee of T. W. Miller and A. D. Greene, all of Ashland, O., U. S. A.
383,355. **Belt Gearing.** Allis-Chalmers Mfg. Co., Milwaukee, Wis., assingee of A. A. Dahms, Chicago, Ill., and T. C. Knudsen, Milwaukee, Wis., all in the U. S. A.
383,527. **Road Marker.** J. A. Ledoux, Worcester, Mass., U. S. A.
383,599. **Sole.** S. Kay & Co., Ltd., and W. Kay, both of Bury.
383,618. **Aircraft Landing Gear.** P. E. G. Marinier, Seine, France.
384,098. **Shaving Appliance.** F. T. Hope, Seattle, Wash., U. S. A.
384,108. **Universal Joint.** Budd Wheel Co., assignee of R. H. Rosenberg, both of Philadelphia, Pa., U. S. A.
384,435. **Driving Belt.** O. L. Whittle, Lancashire.

Germany

569,929. **Hose.** E. Kubler & Co., m.b.H., Berlin-Reinickendorf-West.

Trade Marks

United States

300,512. Representation of 2 cats below the words: **"Copy-Cat."** Footwear. Johnson-Stephens & Shinkle Shoe Co., St. Louis, Mo.
300,623. **Snow Pants.** Footwear, etc. Best & Co., Inc., New York, N. Y.
300,758. **Belinde.** Soap dishes, tooth brush stands, egg cups, and drip catchers. "Semperit" Oesterreichisch-Amerikanische Gummiwerke A.G., Vienna, Austria.
300,759. Blue and yellow stripe interposed between a red stripe and a blue one, the stripes being formed by the exposed edges of the 4 layers of rubber of the patching material. Tire patching material and repair kits. Western States Mfg. Co., Sioux City, Iowa.
300,763. Representation of a paddle and a ball and the words: **"Bo-Lo Bouncer."** Toy of the bandalore type. All-Metal Bottle Cooler Corp., Atlanta, Ga.
300,788. **Spongex.** Sponge rubber and rubber sponges. Sponge Rubber Products Co., Derby, Conn.
300,805. **Blue Target.** Jar rings. Jenkins Bros., New York, N. Y.
300,806. **Speedway.** Tires, inner tubes, hose, and tubing. Goodyear Tire & Rubber Co., Akron, O.
300,846. Representation of a baby holding a nurser and below the words: **"Ingram's—Babies Know the Difference."** Nipples. Ernest Monnier, Inc., Boston, Mass.
300,848. **Bag-A-Telle.** Combined water bottle and syringe. Donald F. Duncan, Inc., Chicago, Ill.
300,893. Triangle containing the letters: **"W T."** Druggists' sundries. Whitall Tatum Co., Millville, N. J.
300,895. Red, blue, and gold rectangle containing circle containing the words: **"The gold Trojan,"** and a diamond containing the words: **"Trojan Brand."** Prophylactic articles. Youngs Rubber Corp., Inc., New York, N. Y.
300,896. Red, blue, and gold circle containing the words: **"The gold Trojan."** Prophylactic articles. Youngs Rubber Corp., Inc., New York, N. Y.
300,926. **Pliolite.** Paint, varnish, and enamel. Goodyear Tire & Rubber Co., Akron, O.
300,949. **Durite.** Flooring. United States Rubber Co., New York, N. Y.
301,114. **Kenwood.** Golf balls and clubs. P. Goldsmith Sons Co., Cincinnati, O.

Editor's Book Table

BIBLIOGRAPHY

SUPERFICIAL AFFINITY OF CAOUTCHOUC FOR FILLERS. E. Vellinger, *Compt. rend.*, 195, 1015-16 (1932).

EFFECTS OF ADDITION OF SELENIUM ON THE PROPERTIES OF VULCANIZED RUBBER. G. Gallie and J. R. Scott, *J. Res. Asso. Brit. Rubber Manufrs.*, 1, 111-13 (1932).

FACTORS AFFECTING RATE OF VULCANIZATION OF CHLOROPRENE PLASTIC POLYMERS. E. R. Bridgwater and E. H. Krismann, *Ind. Eng. Chem.*, Mar., 1933, pp. 280-83.

SOLVENT RECOVERY. Anon., *Rubber Age (London)*, Feb., 1933, pp. 327-29.

TORNESIT. Chlorinated Rubber for Anti-Corrosion Paints. J. H. Freylender, *Rubber Age (London)*, Feb., 1933. Translated from *Rev. prod. chim.*, 35, 673 (1932).

MECHANICAL MIXING OF ASBESTOS AND RUBBER. B. W. Wetherbee, *India Rubber J.*, Feb. 4, 1933, pp. 128-30.

COMMERCIAL ANTIOXYGENS. F. Jacobs, *Caoutchouc & gutta-percha*, Feb. 15, 1933, pp. 16294-96. (To be continued.)

IMPREGNATIONS FOR WATERPROOF FABRICS. R. Ditmar, *Caoutchouc & gutta-percha*, Feb. 15, 1933, pp. 16298-99. (To be continued.)

OBSERVATIONS ON THE AGING OF VULCANIZED RUBBER OBJECTS. T. Boussand, *Rev. gén. caoutchouc*, Jan., 1933, p. 3.

OBSERVATION ON THE FORMATION OF PORES. T. Boussand, *Rev. gén. caoutchouc*, Jan., 1933, p. 4.

VULCANIZATION WITHOUT SULPHUR. M. G. Dumonthier, *Rev. gén. caoutchouc*, Jan., 1933, pp. 5-6.

MEASURING THE SWELLING OF VULCANIZED RUBBER IN ORGANIC LIQUIDS WITH A VOLUMINOMETER. D. J. van Wijk, *Kautschuk*, Feb., 1933, pp. 18-20.

ELECTRO-DEPOSITION OF RUBBER FROM REVERTEX AND REVULTEX. N. Budiloff, *Kautschuk*, Feb., 1933, pp. 20-25. (Conclusion.)

MANUFACTURE OF RUBBER BALLOONS. *Gummi-Ztg.*, Feb. 3, 1933, p. 464.

SOLVENT RECOVERY. E. Wurm, *Gummi-Ztg.*, Feb. 10, 1933, pp. 487-88.

TOWARD CORRECTING AND AMPLIFYING THE HISTORY OF CHLORINATED RUBBER. L. Eck, *Gummi-Ztg.*, Feb. 17, 1933, pp. 517-18.

STUMP GRAFTING ON ROOTS OF OLD HEVEA TREES. A. d'Angremond, *Arch. Rubbercultuur*, Dec., 1932, pp. 349-56. English version, pp. 357-63.

YIELD FIGURES FROM LEGITIMATE HEVEA SEEDLINGS IN 1931 IN THE SOENGEI PANTJOER EXPERIMENTAL GARDEN. C. Heusser, *Arch. Rubbercultuur*, Dec., 1932, pp. 364-77. English version, pp. 378-91.

RELIABLE METHOD FOR JUDGING BUDDINGS AND SEEDLINGS. D. J. N. van der Hoop, *Arch. Rubbercultuur*, Dec., 1932, pp. 410-15.

NEW PUBLICATIONS

'Government Extravagance—the Cause of Price Cutting." Allen W. Rucker in collaboration with N. W. Pickering, president, Farrel-Birmingham Co., 6 Main St., Ansonia, Conn. In this 12-page booklet are discussed in detail government extravagance and its effects on business and price cutting, "or, more accurately, profit cutting," as evidenced by such statements as "Here, then, is probably the chief underlying cause of price cutting—a deficiency of purchasing power caused by use of bank credit for governmental financing. . . . The inflation in government is matched by a corresponding deflation of business, and price cutting continues because of that fact. . . . What is required is a drastic cut in government costs."

"Mechanical Rubber Goods for All Industries." Rubbercraft Corp. of California, Ltd., 110 E. 17th St., Los Angeles, Calif. This catalog lists and illustrates an extremely large variety of molded rubber specialties for mechanical, sport, and many other purposes.

"Plumbing and Miscellaneous Goods." Jos. Stokes Rubber Co., Trenton, N. J. Many hard rubber fittings are illustrated and described in this section from the company's catalog, which also includes some items of the Stokes plastic line. The Chemical Section pages give data on hard rubber pipe, and fittings for conducting acids and other corrosive liquids.

"Digest of Patents Dealing with Rubber and/or Latex in Road Construction Materials (Excluding Blocks)." Technical Research and Development of New Uses Committee of The Rubber Growers' Association, Inc., 2, 3, and 4 Idol Lane, Eastcheap, London, E.C.3, England. Sections of this digest are devoted to: preparation of purely bituminous emulsions; compositions containing latex or raw rubber plus bitumen, etc.; compositions containing vulcanized rubber and bitumens, etc.; compositions containing latex or raw rubber and cements, etc.; various compositions not necessarily bituminous; methods of attachment to surfaces, etc. This digest should prove of assistance to those who require a handy reference of the patent literature of the subject.

MUTUAL INFLUENCE OF STOCK AND SCION IN HEVEA BUDDINGS. D. J. N. van der Hoop and F. W. Ostendorf, *Arch. Rubbercultuur*, Dec., 1932, pp. 392-406. English summary, pp. 407-409.

BOOK REVIEWS

"Handbook of Chemistry and Physics. A Ready Reference Book of Chemical and Physical Data." Seventeenth Edition, 1932. Editor in Chief, Charles D. Hodgman. Chemical Rubber Publishing Co., 1900 W. 112th St., Cleveland, O. Flexible leather, 1,722 pages; 4⅛ by 6¾ inches. Price $6.

In the preparation of the seventeenth edition the "Handbook of Chemistry and Physics" has been subjected to an unusually extensive revision. A very large number of tables have been revised and enlarged. Material covering more than 300 pages in the sixteenth edition has been extensively changed involving an increase of over 100 pages. Wholly new material has been added.

The most important revision is that of the table "Physical Constants of Organic Compounds" which has been completely recompiled and is now presented in new form. This new table of Organic Compounds, covering 220 pages, was compiled with the assistance of 125 professors of organic chemistry and a number of directors of commercial research in this country. The data for every compound have been carefully revised and more than 1,000 new compounds added because of their commercial importance and value in teaching or in research.

A considerable addition has been made to the mathematical section of the book, including a very complete collection of "Integrals" and extensive "Interest Tables." The sections devoted to "Heat of Formation and Solution" and to "Vapor Pressure" also have been completely revised. A new and very complete table of 'Magnetic Susceptibility" has been added.

"Chemical Guide Book." 1933. Ninth Edition. Chemical Markets, Inc., 25 Spruce St., New York, N. Y. Cloth, 600 pages, 4 by 9 inches.

This trade annual is a complete directory and buyers' guide for those interested in purchasing supplies of chemicals. The work comprises 5 divisions, as follows: Part I, Catalog of leading chemical firms arranged alphabetically; Part II, Buying guide and directory; Part III, Geographical directory of the chemical and allied trades; Part IV, Buyers' guide on containers, packing, and shipping supplies; and Part V, Chemical statistics.

A valuable feature is the brief descriptive item under each material listed covering its chemical and physical properties and manufacturing uses.

SULPHUR DUSTING EXPERIMENTS ON RUBBER PLANTATIONS. F. Beeley, *J. Rubber Res. Inst. Malaya*, 4, 115-22 (1932).

Market Reviews

CRUDE RUBBER

THE effects of the banking moratorium on the rubber market were not very great, and the market has settled down again into the groove it had worn for itself before the upheaval. But as it affects the rubber industry through the automobile market, the moratorium is still present.

Out in Detroit the conservators appointed by the government are having difficulty unsnarling the banking situation; and with the banks closed in that area automobile factories have also remained closed or are operating at reduced rates. Ford closed his plant completely during the week ended March 18, and Chevrolet accounted for 7,250 of the 10,000 or so cars produced.

March output, therefore, will probably be extremely low, and since for 10 days consumers were unable to touch their money in banks, sales too will undoubtedly be low.

Consumption of crude rubber will be lower than the rate in February, from all reports. February consumption was only 20,462 tons, compared with 21,661 in January, and 30,013 in February, 1932. The low rate of tire and automobile consumption is responsible for this showing.

Imports of crude rubber in the United States showed a satisfying drop, and at 18,875 tons, were 39.3% under January and 38.2% under February, 1932. Traders, however, do not believe that there is any definite indication as yet that production has reversed its trend. The feeling seems to be that if rubber production fell off last month, it will be so much greater this month.

Restriction rumors again appeared the first of the month, but were lost sight of when domestic conditions filled the picture. No one takes these recurrent rumors seriously because the Dutch Government opposes any plans for control of production.

Stocks on hand declined fractionally in this country because of the low rate of imports, but with expectations of larger shipments and lower consumption in March, the figure will probably resume its upward climb. London and Liverpool stocks are getting more and more manageable, and according to a compilation by Robert L. Baird, of H. Hentz & Co., total world stocks at the end of February are about 600,000 tons, compared with 606,028 last February and 634,812 tons last January.

RUBBER BULL POINTS

1. **A cut in tire prices and united action by the large manufacturers in an effort to standardize and simplify brands offered is expected to restore stabilization to the tire industry if all cooperate.**
2. **Imports of crude rubber to the United States in February were 18,875 tons, a drop of 39.3% from January and 38.2% from February, 1932.**
3. **Pneumatic casings on hand January 31 were 5.3% below December 31, 1932, and 8.5% under January 31, 1932.**
4. **Crude rubber afloat to the United States on February 28 was 32,898 tons against 68,970 at the same time last year.**
5. **Stocks at Singapore, Penang, etc., were 29,070 tons on February 28 against 52,287 on February 29, 1932.**
6. **February Malay shipments were 37,564 tons against 42,008 a year before.**

RUBBER BEAR POINTS

1. **Automobile production has fallen sharply because of banking difficulties in Detroit.**
2. **Consumption of crude rubber for February in the United States was 20,462 tons against 21,661 in January and 30,013 in February, 1932.**
3. **January shipments of pneumatic casings were 20.2% below those of January, 1932, and production was 34.8% lower.**
4. **United States stocks of rubber on hand are 393,640 tons against 322,117 last year.**
5. **Ceylon shipments in February were 5,039 tons against 4,462 last year.**

An encouraging development last month was the action by the large tire companies in stabilizing prices and simplifying their lines. In a frank statement, it was declared that the reduction in prices was not new, but was simply a recognition of actual prices as they had prevailed for some time. Trade discounts and other concessions had almost nullified list prices before the change was announced. The reduction in brands also seems a logical step—an aid to the dealer as well as to the manufacturer.

The Outside Market was busy for a time following the banking holiday, but in the last week of the month, with manufacturers again supplied, business went dull. Prices, after recovering about ¼¢, reverted to the low levels prevailing before the holiday.

Week ended March 4. Prior to the banking holiday declared on Saturday, which closed all exchanges, the rubber market advanced more than for many weeks. The gains of from 15 to 22 points scored on the Rubber Exchange were largely a result of covering by hedge operators, the prompt taking up of notices for March, and favorable reports from producing centers.

The March contract closed at 2.97¢, compared with 2.82¢ the week before; May 3.06 against 2.89; July 3.15 against 2.98; September 3.25 against 3.07; December 3.35 against 3.15; and January 3.41 against 3.19.

Malay shipments in February were 37,564 tons, compared with 46,599 tons in January and 42,008 tons in February, 1932. January shipments from Dutch East Indies were 17,400 tons against 20,670 tons in December and 23,037 tons in January, 1932. Both these figures were less than the seasonal declines. Ceylon shipments for February, however, were 5,039 tons against 4,641 tons in January and 4,462 tons in February, 1932. Estimates for a large increase in British stocks over the week-end were disappointing since British stocks have not gained for many weeks.

Estate production reported at the end of last week put output by small estates in January at 16,106 tons, compared with 18,534 tons in December; and on large estates it was 19,716 tons against 22,440 tons in the previous month.

Estate stocks on January 31 totaled 21,517 tons against 21,777 tons in December and 22,161 tons in January, 1932. Dealers' stocks were 24,904 tons, compared with 24,320 tons in December and 26,468 tons a year ago.

On Thursday the market rallied from 11 to 16 points on reports from Amsterdam that efforts were again being made to introduce some kind of restriction in the Dutch East Indies.

If what the recently published Standard Statistics survey says is true, the tire industry is facing worse conditions: "Replacement purchases for the current year are estimated at 20% below the limited 1932 volume."

In the automobile field the survey re-

New York Outside Market—Spot Closing Rubber Prices—Cents per Pound

	February, 1933							
	20	21	22*	23	24	25	27	28
Ribbed Smoked Sheet	2 15/16	2 15/16	...	2 15/16	2 15/16	2 15/16	2 7/8	2 7/8
No. 1 Thin Latex Crepe	3 5/8	3 5/8	...	3 5/8	3 5/8	3 5/8	3 5/8	3 5/8
No. 1 Thick Latex Crepe	3 1/2	3 1/2	...	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2
No. 1 Brown Crepe	2 1/2	2 1/2	...	2 1/2	2 1/2	2 1/2	2 7/16	2 7/16
No. 2 Brown Crepe	2 3/8	2 3/8	...	2 3/8	2 3/8	2 3/8	2 5/16	2 5/16
No. 2 Amber	2 1/2	2 1/2	...	2 1/2	2 1/2	2 1/2	2 7/16	2 7/16
No. 3 Amber	2 3/8	2 3/8	..	2 3/8	2 3/8	2 3/8	2 5/16	2 5/16
No. 4 Amber	2 1/4	2 1/4	..	2 1/4	2 1/4	2 1/4	2 3/16	2 3/16
Rolled Brown	2 1/8	2 1/8	...	2 1/8	2 1/8	2 1/8	2 1/16	2 1/16

	March, 1933														
	1	2	3†	13	14	15	16	17	18	20	21	22	23	24	25
Ribbed Smoked Sheet	2 15/16	3	3	3	3	3 1/16	3 3/16	3 1/16	3 1/16	3 1/16	3 1/16	3	3	2 15/16	2 15/16
No. 1 Thin Latex Crepe	3 5/8	3 11/16	3 11/16	3 3/4	3 3/4	3 13/16	3 7/8	3 13/16	3 13/16	3 13/16	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4
No. 1 Thick Latex Crepe	3 1/2	3 9/16	3 9/16	3 5/8	3 5/8	3 11/16	3 3/4	3 11/16	3 11/16	3 11/16	3 5/8	3 5/8	3 5/8	3 5/8	3 5/8
No. 1 Brown Crepe	2 1/2	2 9/16	2 9/16	2 9/16	2 9/16	2 5/8	2 5/8	2 9/16	2 9/16	2 9/16	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
No. 2 Brown Crepe	2 3/8	2 7/16	2 7/16	2 7/16	2 7/16	2 1/2	2 1/2	2 7/16	2 7/16	2 7/16	2 3/8	2 3/8	2 3/8	2 3/8	2 3/8
No. 2 Amber	2 1/2	2 9/16	2 9/16	2 9/16	2 9/16	2 5/8	2 5/8	2 9/16	2 9/16	2 9/16	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
No. 3 Amber	2 3/8	2 7/16	2 7/16	2 7/16	2 7/16	2 1/2	2 1/2	2 7/16	2 7/16	2 7/16	2 3/8	2 3/8	2 3/8	2 3/8	2 3/8
No. 4 Amber	2 1/4	2 5/16	2 5/16	2 5/16	2 5/16	2 3/8	2 3/8	2 5/16	2 5/16	2 5/16	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4
Rolled Brown	2 1/8	2 3/16	2 3/16	2 1/8	2 1/8	2 3/16	2 1/4	2 3/16	2 3/16	2 3/16	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8

* Holiday. † Market closed from March 4 to 11, inclusive, for bank holiday.

ports. "Sales data clearly reveal the continuing trend of demand toward the lower priced offerings in the passenger car field."

So far this year the bulk of activity has been provided by the small car manufacturers. Last week Ford swung into increased production; while Chevrolet cut down its output to estimated February demand.

In the Outside Market business was fairly good on the advance, but stopped altogether on the declaration of the moratorium in banks and exchanges. Prices on Friday were unchanged from a week ago. March sold at 3¢; April-June 3 1/16; July-September 3 3/16; and October-December at 3 5/16.

Week ended March 11. Closed since last Saturday, the rubber market was at a complete standstill. Even traders in actuals reported no inquiries or sales; and what the course of prices will be when the Exchange reopens, no one would predict. On the last trading day quotations for nearby rubber were about 3¢.

Judging by sentiment in the other commodity markets, however, there is a basis for optimism. What has strangled the markets more than anything has been the lack of buying caused by a fear of future business conditions.

With the forthright action taken by the Administration in the crisis, a tremendous wave of confidence has permeated the country. Fear of inflation has been dispelled; the President has been given broad powers to adjust the banking situation; he has been authorized to slash expenditures and balance the budget; and just before this was written on Sunday night he spoke to the people on a national radio hookup. His message was one of confidence and a call for cooperation on the part of the people. He explained the measures he had taken since declaring the moratorium last Friday and appealed for a cessation of the fear that had undermined the people previous to his action. It was a straightforward talk which must have given renewed hope to the millions that listened.

Moratorium or not, some businesses seem to go on just the same. Chevrolet had the courage to announce a new line of cars in the last week and, together with increased operations by Ford, resulted in an increase in the level of output.

Week ended March 18. The rubber market partook of the confidence of the other commodity markets when it reopened Wednesday with advances of 7 to 9 points, but the gain was short lived. On Friday the trend was reversed, and on Saturday prices were from one to 2 points lower than the quotations last quoted.

March closed at 3.03¢, compared with 3.05¢ when the Exchange opened on March 15; May 3.13 against 3.15; July 3.22 against 3.24; September 3.33 unchanged; December 3.45 against 3.44; and January 3.50 against 3.48.

The buying orders came mostly from importers and speculators, but with no support from factory buyers, soon faded. Besides the market had had another consumption report to absorb on Tuesday, which showed poor takings although imports were much lower.

February consumption, according to the Rubber Manufacturers Association was 20,462 long tons against 21,661 long tons for January, 1933, and 30,012 for February, 1932. For the first 2 months of 1933 it was 42,123 long tons, compared with 57,974 in the first 2 months last year.

With banks in Michigan closed for 4 weeks automobile plants sharply curtailed output. Reports for the current week, however, indicate that activities are being resumed with the taking back of men, and the index of production should soon turn upward.

For the March 11 week the index of *The New York Times* was 17.9 against 32.6 for the March 4 week and 34.8 for the corresponding week last year.

Factory buying was evident on a slightly larger scale during the last week, but "not enough to get excited about." In fact the picture in factories is far from encouraging. The large rubber companies, making tires principally, lost large sums in their 1932 operations and are still operating on a limited scale. Optimism is more prevalent than it has been due to the effect of the measures taken by the Roosevelt Administration, and should the confidence inspired translate itself into a revival of buying power and creation of work, the story should take a happier turn.

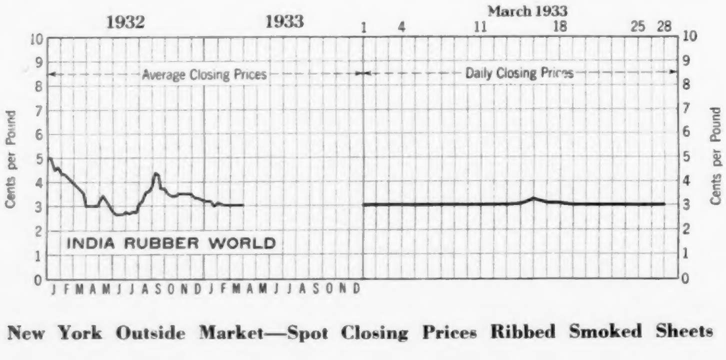
Prices on ribbed smoked sheets were quoted as follows: March 3⅛; April-June 3¼; July-September 3⅜; and October-December 3½.

Week ended March 25. Transactions on the Rubber Exchange were fewer in the last week, and with other commodity market prices easing off, rubber quotations also declined. The manufacturing industry operated at a low rate, especially in the automobile field. A readjustment in the tire industry has possibilities for future stabilization and correction of abuses, but the present rate of production is low. Prices on the Exchange declined from 11 to 16 points, bringing contracts to within a few points of the year's lows.

May contracts closed the week at 3.02¢, compared with 3.13¢ last week; July 3.08 against 3.22; September 3.17 against 3.33; December 3.29 against 3.45; and January 3.34 against 3.50.

Only 10,633 cars and trucks were produced in the week ended March 18, according to *Cram's Automotive Reports*, with Chevrolet accounting for 7,250 of the units. The index of *The New York Times* hit 10.8 for this week, compared with 17.9 for the March 11 week, and with 33.5 for the corresponding week last year. The difficulties in the banking situation were not yet straightened out, with 2 of the largest banks closed. Ford plants shut

(*Continued on page 66*)



New York Outside Market—Spot Closing Prices Ribbed Smoked Sheets

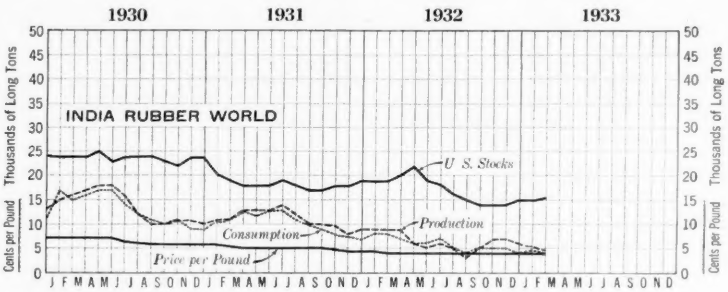
New York Quotations

New York outside market rubber quotations in cents per pound

Plantations	Mar. 28, 1932	Feb. 25, 1933	Mar. 28, 1933
Rubber latex....*gal.*	51	42	42
Sheet			
Ribbed, smoked, spot	3⅛	2 15/16	2 15/16/3
Apr.-June	3⅛	3 /3 1/16	3 /3⅛
July-Sept.	3⅜	3⅛/3¼	3⅛/3 3/16
Oct.-Dec.	3½	...	3¼/3⅜
Crepe			
No. 1 thin latex, spot	4⅜	3¾/3 13/16	3 13/16/3⅞
Apr.-June	4⅜	3⅞/3 15/16	3¾/4
July-Sept.	4⅝	4 /4⅛	3⅞/4⅛
Oct.-Dec.	**4¾**	...	4 /4¼
No. 2 Amber, spot	3 1/16	2½	2½/2⅝
Apr.-June	3 1/16	2⅝	2 9/16/2⅝
July-Sept.	3 5/16	2¾/2 13/16	2 11/16/2¾
Oct.-Dec.	**3 7/16**	..	2 13/16/2⅞
No. 3 Amber, spot	3	2 7/16	2⅜/2 7/16
No. 1 Brown	3 1/16	2½	2 7/16
Brown, rolled	2⅞	2 3/16	2⅛
Paras			
Upriver fine	5⅜	5½	5¾
Upriver fine	*8¼	*9⅛	*9
Upriver coarse	†2½	..	..
Upriver coarse	*4¼	*4¾	*5
Islands fine	†5	..	6
Islands fine	*8	*9	*9
Acre, Bolivian fine	5½	5⅞	6
Acre, Bolivian fine	*8½	*9¼	*9¼
Beni Bolivian	5½	6	6⅛
Madeira fine	†5½	5⅝	5⅞
Pontianak			
Bandiermasin	5	4	4
Pressed block	7½	6½	6½
Sarawak	5	4	4
Caucho			
Upper ball	†2½	..	..
Upper ball	*4¼	*4¾	*5
Lower ball	†2	...	...
Manicobas			
Manicoba, 30% guar.	†2½	†2¼	†2¼
Mangabiera, thin sheet	†2½	...	...
Guayule			
Duro, washed and dried	13	12	12
Ampar	14	13	13
Africans			
Rio Nuñez	8	...	8
Black Kassai	8	...	7½
Manihot cuttings	4	...	3½
Prime Niger flake	15	...	15
Gutta Percha			
Gutta Siak	8	6½	6¼
Gutta Soh	17	11	12
Red Macassar	1.50	1.75	1.50
Balata			
Block, Ciudad Bolivar	17	16½	18
Manaos block	17	17	19
Surinam sheets	35	26	28
Amber	37	28	30

* Washed and dried crepe. Shipments from Brazil. † Nominal.

RECLAIMED RUBBER



Production, Consumption, Stocks, and Price of Tire Reclaim

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption	Consumption Per Cent to Crude	United States Stocks*	Exports
1930	157.967	153,497	41.5	24,008	9,468
1931	132.462	125,001	35.7	19,257	6,971
1932	74.811	71,992	23.2	15,202	3,536
1933					
January	5.245	4,506	20.8	15,117	130
February	4,530	4,087	20.0	15,403	178

* Stocks on hand the last of the month or year.

Compiled by The Rubber Manufacturers Association, Inc.

THE principal industrial event in March was the bank holiday which for the time stagnated industrial activity in virtually all lines. Banking conditions in Akron were especially unfortunate for the rubber and other industries centering there. During the intermission of banking facilities, however, orders continued to be placed for reclaim, and the normal demand prevailing before the holiday was resumed promptly after it ended.

A good seasonal increase of reclaim consumption is probable during the spring as motorists realize the wisdom of replacing for safety's sake their well-worn tires. Rubber manufacturers producing hose and general mechanical rubber goods are speeding up on production for the customary seasonal demand.

The long anticipated legalization of beer is looked upon as an important stimulus to general business in which rubber goods manufacturers will benefit appreciably since it is estimated that brewers will spend about $3,500,000 for tires and $750,000 for other rubber goods. Incidentally reclaimers will share in this benefit to the rubber industry.

Production of reclaim in the United States for February is reported at 4,530 long tons compared with 5,245 long tons in January, a decrease of 715 long tons. Consumption in February was 4,087 long tons against 4,506 long tons for January, a decrease of 419 long tons.

The ratio of consumption of reclaim to crude rubber in February was 20%, a decrease of only 0.8% from the ratio in January. This is a remarkably small decrease and is accounted for by the fact that reclaim is firmly established as an essential ingredient in rubber mixings because of its undisputed technical value in mixing, extruding, and quality standardizing rubber products of recognized commercial grade.

Quotations of standard reclaim qualities are unchanged from one month ago.

New York Quotations

March 28, 1933

	Spec. Grav.	Cents per Lb.
High Tensile		
Super-reclaim, black	1.20	5 /5¼
red	1.20	4¾/5
Auto Tire		
Black	1.21	3¾/4
Black selected tires	1.18	4 /4¼
Dark gray	1.35	5 /5¼
White	1.40	6 /6½
Shoe		
Unwashed	1.60	4¾/5
Washed	1.50	5½/5¾
Tube		
No. 1	1.00	6½
No. 2	1.10	4½/4¾
Truck Tire		
Truck tire, heavy gravity	1.55	5 /5¼
Truck tire, light gravity	1.40	5¼/5½
Miscellaneous		
Mechanical blends	1.60	3 /3¼

Colloidal Whiting

The property of rubber depends more on the physical factors than upon the chemical factors of its ingredients. One of the newest forms of whiting, the long established filler or body maker in rubber compounding, is Hakuenka, a specially processed colloidal form of whiting produced in Japan. It is said to be the only colloidal whiting extant and is characteristically effective for improving the physical properties of rubber. Its range of usefulness is further extended by reason of its whiteness and texture.

RUBBER SCRAP

BANKING conditions probably did not actually discommode the rubber scrap business as it did some others, principally because the consuming demand for scrap grades has been relatively moderate. Collections, usually slow during the winter, will increase with the advent of spring even though the compensation to collectors for their labor is sadly inadequate. Scrap dealers are not overstocked on the various grades, but like the reclaimers whom they serve directly, they expect some increase in business with the trade revival that legalizing beer is expected to promote in many lines.

BOOTS AND SHOES. The demand for scrap black shoes is good because of the superior extrusion quality of shoe reclaim. The supply of black shoe scrap is limited due to the prevailing style tendency to colored shoes.

TIRES. The demand for this grade is steady, holding its own as a constituent of standard general-purpose reclaim.

TUBES. Inner tubes are in fairly good demand because their soft cure and high grade adapt them for reclaims of superior quality.

SOLID TIRES. The export demand is good, but collectors have difficulty in gathering ample tonnage because of the depletion of solids available since they began to be distinctly superseded by giant truck pneumatics.

MECHANICALS AND HARD RUBBER. There has been no quotable change of price for these grades. Prices have been extremely low in conformity with the general lack of demand, and in the case of mechanicals of preference for better grade soft rubber scrap such as tires.

Quotations of standard grades remain unchanged without exception.

CONSUMERS' BUYING PRICES

Carload Lots Delivered Eastern Mills

March 28, 1933

		Prices
Boots and Shoes		
Boots and shoes, black	100 *lb.*	$0.75/$0.90
Colored	100 *lb.*	.625 /.75
Untrimmed arctics	100 *lb.*	.50
Inner Tubes		
No. 1, floating	*lb.*	.02 /.02¼
No. 2, compound	*lb.*	.01⅛/.01¼
Red	*lb.*	.01⅜/.01½
Mixed tubes	*lb.*	.01⅛
Tires (Akron District)		
Pneumatic Standard		
Mixed auto tires with beads	*ton*	7.00/ 7.25
Beadless	*ton*	10.00/10.25
Auto tire carcass	*ton*	6.50/ 6.75
Black auto peelings	*ton*	16.00/16.50
Solid		
Clean mixed truck	*ton*	26.00/26.50
Light gravity	*ton*	28.00/29.00
Mechanicals		
Mixed black scrap	*lb.*	.00⅜/.005
Hose, air brake	*ton*	6.00 /6.50
Garden, rubber covered	*lb.*	.00¼/.00⅜
Steam and water, soft.	*lb.*	.00¼/.00⅜
No. 1 red	*lb.*	.01⅛/.01¼
No. 2 red	*lb.*	.01 /.01⅛
White druggists' sundries	*lb.*	.01¼/.01½
Mechanical	*lb.*	.00¾/.00⅞
Hard Rubber		
No. 1 hard rubber	*lb.*	.06⅛/.06⅝

COMPOUNDING INGREDIENTS

THE general bank holiday for the relief of the banking crisis temporarily retarded business in the rubber industry early last month. The automobile output is reduced to a quarter or less of capacity production which will curtail the production of original equipment tires. The demand by motorists for replacement tires has not yet attained the expected volume. Under these circumstances tire production is proceeding at a closely restricted rate with correspondingly limited demand for compounding supplies and fabrics.

Market conditions with respect to carbon black are for the time being much confused owing to temporary changes in the tire production schedules in Akron. Therefore the rubber tire trade is buying only intermittedly. The price situation remains unchanged at the levels of a month ago.

Mineral rubber is still moving in reasonable volume despite unsettled conditions and at prices better than those in 1932.

Factice is in normal demand at firm prices. Substitutes from rapeseed oil have a tendency to work higher in price owing to the advance in cost of that oil because of the trouble in Manchuria.

Chromium oxide as a rubber color is limited in use largely because of its high specific gravity and its dull color. However, when permanence is a prime consideration and brilliance of color unessential, it serves to very good purpose. Its principal use is in flooring and hose compounds, also to some extent in packings and in various small miscellaneous articles. Production has exceeded demand by a wide margin for the past few years with the result that price conditions have been badly disturbed. Present prices are just about at cost of production without giving consideration to the expense of overhead, depreciation, sales cost, etc.

Chromium hydroxide is also limited in its application as a rubber color and is used only when delicate color is required and because of its relatively low specific gravity. Its production is limited, and the prices are fairly stable.

Lithopone, litharge, titanium pigments, and zinc oxide are all in limited demand at prices unchanged from a month ago.

Heavy and light gravity petroleum rubber solvents have declined and are offered by Group 3 refineries at 4¾ to 5¢ in tank car lots, refinery basis.

New York Quotations

March 28, 1933

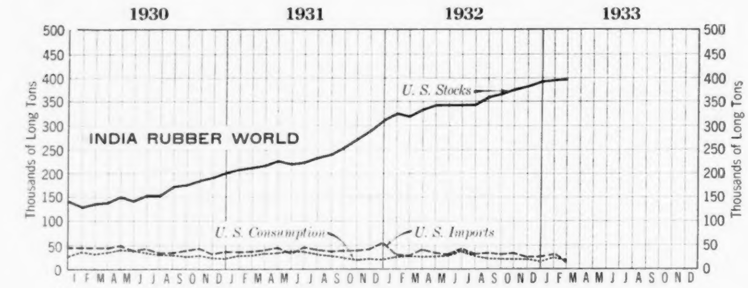
Prices Not Reported Will Be Supplied on Application

Abrasives			
Pumicestone, pwd.	lb.	$0.02½	/$0.04
Rottenstone, domestic	ton	23.50	/28.00
Accelerators, Inorganic			
Lime, hydrated	ton	20.00	
Litharge (commercial)	lb.	.05¾	
Magnesia, calcined, heavy	lb.	.04	/ .04½
carbonate	lb.	.05¾	/ .06
Accelerators, Organic			
Accelerator 49	lb.	.38	/ .48
Aldehyde ammonia	lb.	.65	/ .70
Altax	lb.		
Barak	lb.		
BLE	lb.		
Butene	lb.		
Captax	lb.		
Crylene	lb.		
paste	lb.		
DBA	lb.		
Di-esterex N.	lb.		
DOTG	lb.	.42	/ .52
DPG	lb.	.33	/ .43
du Pont 808	lb.		
833	lb.		
Ethylidine aniline	lb.		
Formaldehyde aniline	lb.	.37½	/ .40
Heptene	lb.		
base	lb.		
Hexamethylenetetramine	lb.	.46	/ .47
Lead oleate, No. 999	lb.	.08½	
Witco	lb.	.10	
Lithex	lb.		
Monex	lb.		
Novex	lb.		
Plastone	lb.		
R & H 40	lb.		
50-D	lb.		
Safex	lb.		
Super-sulphur No. 1	lb.		
No. 2	lb.		
Tetrone A	lb.		
Thiocarbanilid	lb.	.20	
Thionex	lb.		
Trimene	lb.		
base	lb.		
Triphenyl guanidine	lb.	.58	/ .60
Tuads	lb.		
Vulcanex	lb.		
Vulcanol	lb.		
Vulcone	lb.		
ZBX	lb.		
Zimate	lb.		
Acids			
Acetic 28% (bbls.)	100 lbs.	2.65	/ 2.90
glacial (carboys)	100 lbs.	9.64	/ 9.89
Sulphuric, 66°	ton	15.50	
Age Resisters			
Age-Rite Gel	lb.		
powder	lb.		
resin	lb.		
white	lb.		
Albasan	lb.		
Antox	lb.		
Neozone	lb.		
Permalux	lb.		
VGB	lb.		
Zalba	lb.		
Antiscorch Material			
UTB	lb.		
Antisun Materials			
Heliozone	lb.		
Sunproof	lb.		
Binders, Fibrous			
Cotton flock, dark	lb.	$0.09	/$0.10
dyed	lb.	.50	
white	lb.	.11	/ .16
Rayon flock, colored	lb.	1.75	
white	lb.	1.40	
Colors			
BLACK			
Bone, powdered	lb.	.05½	/ .15
Drop	lb.	.05½	/ .17
Lampblack (commercial)	lb.	.08	/ .12
BLUE			
Prussian	lb.	.35	/ .37
Toners	lb.	.80	/ 3.50
Ultramarine	lb.	.07	/ .10
BROWN			
Mapico	lb.	.13	
Sienna, Italian, raw, pwd.	lb.	.04½	/ .11
GREEN			
Chrome, light	lb.	.23	/ .25½
medium	lb.	.26	/ .27½
oxide	lb.	.19	/ .21
Guignet's	lb.	.70	
Toners	lb.	.85	/ 3.50
ORANGE			
Toners	lb.	.40	/ 1.60
ORCHID			
Toners	lb.	1.50	/ 2.00
PINK			
Toners	lb.	1.50	/ 4.00
PURPLE			
Toners	lb.	.60	/ 2.00
RED			
Antimony			
Crimson, R. M. P. No. 3	lb.	.46	
Sulphur free	lb.	.48	
7-A	lb.	.32	
Z-2	lb.	.20	
Iron Oxides			
Rub-er-red	lb.	.08¾	
Mapico	lb.	.08¾	
Toners	lb.	.80	/ 2.00
WHITE			
Lithopone	lb.	.04½	/ .04¾
Albalith	lb.	.04½	/ .04¾
Cryptone No. 19	lb.	.06	/ .06¼
CB No. 21	lb.	.06	/ .06¼
Grasselli	lb.	.04½	/ .05
Titanium oxide, pure	lb.	.17	/ .18¾
Titanox "B"	lb.	.06	/ .06½
"C"	lb.	.06	/ .06½
Zinc Oxide			
Black label (lead free)	lb.	.05¾	
F. P. Florence, green seal	lb.	.09⅝	/ .09⅞
red seal	lb.	.08⅝	/ .08⅞
white seal (bbls.)	lb.	.10⅞	
Green label (lead free)	lb.	.05¾	
seal, Anaconda	lb.	.09⅝	/ .10⅛
Horsehead (lead free) brand			
Selected	lb.	$0.05¾	/$0.06
Special	lb.	.05¾	/ .06
XX	lb.	.05¾	/ .06
green	lb.	.05¾	/ .06
red	lb.	.05¾	/ .06
Kadox, black label	lb.	.09⅝	/ .09⅞
blue label	lb.	.08⅝	/ .08⅞
red label	lb.	.07¼	/ .07½
Lehigh (leaded)	lb	.0490	/ .0515
Red label (lead free)	lb.	.05¾	
seal, Anaconda	lb.	.08⅝	/ .09⅛
Standard (leaded)	lb.	.05½	/ .05¾
Sterling (leaded)	lb	.05½	/ .05¾
Superior (leaded)	lb.	.05½	/ .05¾
U. S. P. (bbls.)	lb.	.12¾	
White seal, Anaconda	lb.	.10⅞	/ .11⅞
XX zinc sulphide (bbls.)	lb	.13	
YELLOW			
Chrome	lb.	.15	
Mapico	lb.	.09½	
Ochre, domestic	lb.	.01⅜	/ .02⅝
Toners	lb.	2.50	
Factice—See Rubber Substitutes			
Fillers, Inert			
Asbestine	ton		
Barium sulphate, Grasselli (blanc fixe)	ton		
Barytes (f.o.b. St. Louis)	ton	23.00	
off color	ton	15.00	/24.00
white	ton	23.00	/33.00
Blanc fixe, dry, precip	ton	70.00	/75.00
pulp	ton	42.50	/45.00
Infusorial earth	ton	40.00	/45.00
Kalite No. 1	ton		
No. 3	ton		
Suprex, heavy	ton	45.00	/55.00
white, extra light	ton	60.00	/80.00
Whiting			
Chalk, precipitated	lb.		
Domestic	ton	3.50	/ 5.00
Hakuenka	lb.		
Paris white, English cliffstone	100 lbs.		
Sussex	ton		
Witco	ton	15.00	
Fillers for Pliability			
Flex	lb.		
Fumonex	lb.	.0235	/ .06
P-33	lb.		
Thermax	lb.		
Velvetex	lb.	.02	/ .05
Finishes			
Lacquer, rubber, No. 106	gal.	3.00	
Mica, amber	lb.	.04	
Starch, corn, pwd.	100 lbs.	2.19	/ 2.30
Talc, dusting	ton	20.00	
Pyrax A	ton		
Latex Compounding Ingredients			
Accelerator 552	lb.		
Aquarex	lb.		
Catalpo	ton		
Colloidal color pastes	lb.		
sulphur	lb.		
zinc oxide	lb.		
Collway sulphur (dry basis)	lb.		

Disinfectants	lb.	
Dispersed Antox	lb	
Emulsified Heliozone	lb.	
Nekal BX (dry)	lb.	
Neozone L	lb.	
Tepidone	lb.	
Mineral Rubber		
Genasco (fact'y)	ton	$30.00 / $32.00
Gilsonite (fact'y)	ton	37.34 / 39.65
Granulated M. R.	ton	
Hydrocarbon, granulated	ton	40.00 / 42.00
hard	ton	
Parmr Grade 1	ton	20.00 / 23.00
Grade 2	ton	20.00 / 23.00
Mold Lubricants		
Sericite	ton	65.00 / 75.00
Soapbark (cut)	lb.	.05½ / .06
Soapstone	ton	20.00
Oils		
Castor, blown	lb.	.11¾ / .11½
Poppy seed	gal.	1.55
Red, distilled (bbls.)	lb.	.06 / .06⅝
Protective Colloid		
Casein, domestic	lb.	.07 / .07½
Reenforcers		
Carbon Black		
Aerfloted arrow black	lb.	.02¾
Arrow specification black	lb.	.03
Century (works, c. l.)	lb.	.0272
Certified, Cabot, c. l., f. o. b. works, bags	lb.	.02¾
c. l., f. o. b. works, cases	lb.	.04¼
l. c. l., f. o. b. works	lb.	.04¾
Spheron (Dense Dustless Black) c. l., f. o. b. works	lb.	.02¾
Disperso (works, c. l.)	lb.	.0272
Dixie brand	lb.	.0272 / .06½
Kosmos brand	lb.	.0272 / .06½
Micronex	lb.	.03 / .07
Ordinary (compressed or uncompressed)	lb.	.02¾ / .06
Clays		
Blue Ridge, dark	ton	
China	ton	7.00
Dixie	ton	
Langford	ton	
Par	ton	
Perfection	ton	25.00
Standard	ton	
Suprex No. 1	ton	8.00
No. 2, dark	ton	6.50
Glue, high grade	lb.	.16 / .24
Reodorants		
Amora A	lb.	
B	lb.	
C	lb.	
D	lb.	
Latex-O-Dors	lb.	
Rodo	lb.	
Rubber Substitutes or Factice		
Amberex	lb.	.14¾
Black	lb.	.06 / .08
Brown	lb.	.05¾ / .11
White	lb	.07½ / .12
Softeners		
Burgundy pitch	lb.	.04
Emo, brown	lb.	.05
white	lb.	.07
Hardwood pitch, c.l.	ton	25.80 / 26.00
Palm oil (Witco)	lb.	.08
Palmol	lb.	.08¼
Petrolatum, light amber	lb.	.02⅜ / .02½
Pine tar	lb.	.28
Plastogen	lb.	
Rosin oil, compounded	gal.	.40
Rubtack	lb.	.10
Tonox	lb.	
Witco Flux	gal.	.10
Solvents		
Benzol (90% drums)	gal.	.27
Bondogen	gal.	
Carbon bisulphide (drums)	lb	.05½ / .12
tetrachloride	lb.	.06¼ / .09
Turpentine, steam distilled	gal.	.42 / .43
Stabilizers for Cure		
Laurex, ton lots	lb.	
Stearex B	lb.	.06½ / .08
flake	lb	.06½ / .08
Stearic acid, dbl. pres'd	lb.	.07½ / .10
Zinc stearate	lb.	.18 / .20
Vulcanizing Ingredients		
Sulphur		
Chloride, drums	lb.	.03½ / .04
Flowers, extrafine refined, U.S.P.	100 lbs.	
Rubber	100 lbs.	1.85 / 2.60
Tellov	lb.	
Vandex	lb.	

(See also Colors—Antimony)

IMPORTS, CONSUMPTION, AND STOCKS



United States Stocks, Imports, and Consumption

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks

Twelve Months	U. S. Net Imports* Tons	U. S. Consumption Tons	U. S. Stocks on Hand† Tons	U. S. Stocks Afloat† Tons	United Kingdom Stocks†‡ Tons	Singapore and Penang, Etc., Stocks†‡ Tons	World Production (Net Exports)‡ Tons	World Consumption Estimated‡ Tons	World Stocks†‡§ Tons
1930	488,343	375,980	200,998	56,035	118,297	45,179	821,815	684,993	366,034
1931	495,163	348,986	322,825	40,455	127,103	55,458	797,441	668,660	495,724
1932	400,787	313,121	388,229	38,360	92,567	36,802	709,860	670,250	517,598
1933									
January	31,110	21,661	396,376	32,539	89,050	35,746	63,951	52,120	521,173
February	18,875	20,462	393,640	32,898	......	......	......	......	......

*Including liquid latex, but not guayule. †Stocks on hand the last of the month or year. ‡W. H. Rickinson & Son's figures. §Stocks at the 3 main centers, U. S. A., U. K., Singapore and Penang.

MANUFACTURERS in the United States during February, 1933, consumed 20,462 long tons of crude rubber, against 21,661 long tons for January, a decrease of 5.5%. Consumption for February, 1932, was 30,012 long tons. Consumption for first 2 months of 1933 totaled 42,123 long tons as compared with 57,974 long tons for same period 1932.

February imports of crude rubber were 18,875 long tons, a decrease of 39.3% below January and 38.2% below February, 1932.

The Rubber Manufacturers Association estimates total domestic stocks of crude rubber on hand February 28 at 393,640 long tons, compared with January 31 stocks of 396,376 long tons. February, 1933, stocks show a decrease of less than 1% as compared with January of this year, but were 22.2% above the stocks of February 29, 1932.

Crude rubber afloat for the United States ports on February 28 is estimated at 32,898 long tons, compared with 32,539 long tons afloat on January 31, 1933, and 51,728 long tons afloat on February 29, 1932.

London and Liverpool Stocks

Week Ended	London Tons	Liverpool Tons
Mar. 4	38,303	53,850
Mar. 11	38,522	53,531
Mar. 18	39,400	53,716
Mar. 25	40,481	53,692

U. S. Crude and Waste Rubber Imports for 1933

	Plantations	Latex	Paras	Africans	Centrals	Guayule	Manicoba and Matto Grosso	Totals 1933	Totals 1932	Balata	Miscellaneous	Waste
Jan. .... tons	30,123	680	297	10	..	..	..	31,110	31,298	8	516	..
Feb.	18,407	246	217	5	..	..	..	18,875	30,546	16	483	1
Total, 2 mos., 1933 ...... tons	48,530	926	514	15	..	..	..	49,985	.....	24	999	1
Total, 2 mos., 1932 ...... tons	60,888	632	286	38	..	..	..	.....	61,844	151	1,420	50

Compiled from The Rubber Manufacturers Association, Inc., statistics.

Emuwax

Emuwax is the name of a new water dispersible wax possessing great flexibility, light color, and emulsifying properties. It is soluble to a greater extent than natural waxes in organic solvents. It disperses readily in hot water to give milky emulsions and acts as an emulsifier for oils and waxes for polishes, textile rubber softeners, lubricants, etc. It melts at 115.8° F. and will not turn rancid.

COTTON AND FABRICS

LEGISLATION for the relief of the farmer has been the principal influence on the cotton market during the last month. In the last days of February, Congress passed the Smith bill providing for the purchase of all government-owned cotton by a central agency to be resold to farmers who agreed to cut their acreage by 30%. President Hoover pocket-vetoed the bill.

Just as the new president was inaugurated, the banking crisis loomed up and took precedence over everything else. In the 10 days that commodity and stock exchanges were closed, cotton prices advanced sharply. The causes were a holding movement in the South prompted by hopes of higher prices, and expectation of currency inflation.

The administration pulled through the trying 10 days with speed and efficiency, restoring most of the confidence that had been lost and even adding more to the picture. Emergency powers were given the President to control the reopening of the banks, and to slash expenditures to veterans which should help toward balancing the budget.

With the present crop well along indications are that the bill, even if passed, will not affect the present crop. The idea seems to be among farmers that if the measure is going to raise prices, why not plant as much cotton as possible to recoup last year's losses? Manufacturers are worried about the bill because of the excise tax on finished goods as outlined in the Smith bill.

Week ended March 4. The banking holiday, cessation of all trading in exchange, closing of every exchange throughout the country, brought all business to a standstill on Saturday. Up to Friday the cotton market had gained from 32 to 34 points. The holiday in the New Orleans Exchange resulted in limited spot offerings, and under heavy trading the market advanced.

On Friday the March contract closed at 6.18¢, compared with 5.84¢ the week before: May 6.26 against 5.94; July 6.40 against 6.06; October 6.60 against 6.27; December 6.72 against 6.38; and January 6.80 against 6.47.

February sales of fertilizer tags in southern states were reported by the Cotton Exchange Service at 166,000 tons against 183,000 last year and 593,000, 3 years ago. For 3 months to March 1 sales were 319,000 tons against 286,000 and 937,000 respectively.

Business in the primary markets came to a standstill, affecting the price of cotton cloth adversely. Production is being maintained at the seasonal level, and the New York Cotton Exchange Service expects a fair volume of orders until the end of March at least.

Week ended March 11. With United States exchanges closed because of the banking holiday interest centered on foreign markets and on the spot houses in this country.

Liverpool prices gained about 64 points up to Friday, lost about 12 points Saturday, leaving a net gain of over 50 points. Heavy buying from us and from foreign buying on the Continent was responsible for the advance. Cotton stocks in the foreign markets were reported low so that under the heavier demand a rise was scored.

Cotton manufacturers seemed to be anxious to convert their money into goods during the week with the result that activities were stepped up. A strong buying wave developed also, and between the 2, manufacturers were hard put to meet the demand because of the lack of raw material. The consensus of opinion was that prices would be higher on the reopening of the exchanges, and buyers tried to stock up at the lowest prices possible.

As developments in Washington slowly clarified the financial picture, a rush was made to buy spot cotton. Quotations from New Orleans and Memphis at the end of the week put spot cotton at 7½ to 8¢ against 6.35¢ on the last day on which the exchange in New York was open a week earlier. A good many mills, however, did not buy because of their hesitation about making commitments without being able to hedge their purchases.

Cotton cloth production, maintained at a fairly high level for the last few weeks, showed no cessation this week. Worth Street reports put sales of print cloths for the last week at 40,000,000 to 50,000,000 yards, and gray goods sales were estimated at 100,000,000 yards.

February consumption of cotton in this country was estimated at 448,000 bales by the Exchange Service against 451,000 last year. Fertilizer tag sales for January and February were estimated at 501,000 tons by the National Fertilizers Association, compared with 533,000 tons in the same 2 months in 1932 and 942,000 in 1931.

Week ended March 18. After a 10-day banking holiday the cotton market reopened on Thursday and met an accumulation of buying orders. Prices jumped as much as 90 points in some contracts, closing the day with gains of $3 to $4 a bale. Foreign prices did not follow the pace in the New York market, and arbitrage selling erased some of the gains. On Friday, President Roosevelt's Farm Relief Program brought uncertainty into the market because of doubt as to the consequences of the proposals offered; so prices declined 30 to 36 points. Few changes were registered on Saturday, with quotations about 21 to 27 points above those on the last day the Cotton Exchange was open.

March closed the week at 6.40¢, compared with 6.18¢, 2 weeks ago; May 6.47 against 6.26; July 6.61 against 6.40; September 6.77 against 6.53; December 6.98 against 6.72; and January 7.07 against 6.80.

The Relief Bill comprised the 3 plans submitted in the last Congress: the debenture plan, the allotment plan, and the Smith Bill, providing for a tax on consumers. The President was to be given authority to set up any of these proposals as he saw the need of them, and in effect the measures would give dictatorial power to the Secretary of Agriculture. The President himself, in submitting the measure to Congress, admitted that it was of an experimental nature. Manufacturers of goods refused to sell on forward delivery without inserting a protective clause against the probable processing tax, and buyers were reluctant to take contracts on this basis, thus causing the hesitancy in the market at the end of the week.

Figures released by the Department of Commerce showed cotton exports for February of 557,000 bales, 411,000 bales less than in February, 1932. For the 7 months of the season, exports were 329,000 bales less than in the same period last season.

February consumption of cotton was 441,663 bales of lint, compared with 471,202 in January and 451,239 in February, 1932. Cotton in consuming establishments on February 28 was 1,441,641 bales of lint against 1,634,344 on February 29, 1932; and in public storages and compresses it was 9,379,990 bales against 9,510,820 on February 29 last year.

Production of cotton cloth reached a new

COTTON BEAR POINTS

1. **Fear of an excise tax on users of raw cotton because of the enaction of farm relief legislation by Congress has restricted trading in the goods markets.**
2. **World takings by spinners are about 400,000 bales behind those of last year, with the largest drop from the Orient.**
3. **Efforts by European spinners for a week's curtailment of output indicate overproduction.**
4. **Exports are now about 650,000 bales behind those of a year ago.**
5. **Final ginning figures of the Census Bureau show a crop of 12,703,281 bales for 1932, or 287,000 bales above estimates, making a carry-over of over 25,900,000 bales.**
6. **Anticipating better prices because of farm relief measures, planters are reported increasing their acreage this year by 5 to 10%.**
7. **Cotton cloth prices quoted by New England mills are lower, with buyers showing little interest in the new patterns.**
8. **Seven months' exports of cotton cloth from Japan total 1,333,000,000 yards, against 770,000,000 in the same time last season, indicating increased competition for American and British goods.**

COTTON BULL POINTS

1. **The cotton spinning industry operated at 95% capacity on a single shift basis in February against 95.1% in January and 92.5% in February, 1932.**
2. **Early planting conditions have not been favorable to the crop, and preparations are said to be behind normal.**
3. **National Cotton Week is expected to stimulate interest in cotton goods and aid industrial recovery.**
4. **Tags on fertilizer sold in 6 southern states in February represented 166,000 tons against 183,000 last year and 593,000, 3 years ago.**
5. **If the President obtains the emergency powers he is demanding in his farm relief bill, he may be able to raise the level of commodity prices although he is frank to admit that this measure is more of an experiment than any of the other bills he has offered.**

WEEKLY AVERAGE PRICES OF MIDDLING COTTON

Week Ended	Cents per Pound
Feb. 25	6.08
Mar. 4	6.14
Mar. 11	*
Mar. 18	6.65
Mar. 25	6.43

*** New York Cotton Exchange closed for bank holiday from March 4 to 15, inclusive.**

high level for the year last week; prices advanced owing to the increase in raw cotton prices for the duration of the bank holiday, and the Cotton Exchange reported that sales were in excess of current production.

Week ended March 25. Discussion of farm legislation and passage of the bill by the House of Representatives unsettled the cotton market and erased the gains scored during the bank holiday. On Tuesday dollar exchange rose sharply; the pound sold at the lowest point since March 3, causing heavy arbitrage sales in New York, and the selling pressure caused by doubts as to the result of the proposed tax on raw materials for the benefit of cotton farmers, resulted in losses of from 24 to 29 points for the day. The acceptance of the farm bill was not so ready by the Senate, and under prospects that it would probably be altered radically by that body, the market steadied. But prices for the week were from 6 to 13 points lower than at the close of last week.

May contracts closed at 6.38¢, compared with 6.47c the week before; July 6.55 against 6.61; October 6.74 against 6.84; December 6.88 against 6.98; and January was 6.94 against 7.07.

One of the aims of the legislation before Congress for aiding the farmer is to restrict production and thus increase prices. The present crop, however, seems to be too far along for it to be affected by the bill. Farmers, in fact, anticipating an increase in prices, are reported to be planting as much or more cotton than in last year. Preliminary reports indicate that acreage for the next crop will be from 5 to 10% higher than in 1932. It is said that those farmers who planted part of their land to substitute crops last year found that there was little market for them; so they are reverting to cotton.

The spinning industry in February operated at 95% of capacity, according to the Census Bureau, compared with 95.1% in January and 92.5% in February, 1932. Production in March was continued at a good level until the final week when buyers withdrew to ascertain the effect of the farm bill on prices. Activity was also curtailed somewhat because the commodity exchanges were closed during the bank moratorium. European spinners are endeavoring to institute a worldwide curtailment movement of production for at least a week.

World takings by spinners are below last year's, largely owing to smaller absorption by the Orient. Takings in that quarter are 500,000 bales less than last year. Exports, also falling, are now 700,000 bales under those of last season's to the same date.

Cotton Fabrics

DUCKS, DRILLS, AND OSNABURGS. Because of the imminence of enactment of a farm relief bill, allotment plan, involving cotton and in turn textiles it is difficult to quote firm prices representative of the condition in the instance of each cloth. There seems to be a determination among textile manufacturers to work out of the low price field of a month ago and lift prices approximately in keeping with production costs. The improved demand during the bank holiday in anticipation of higher cotton prices than actually prevailed when the exchanges reopened has thinned out somewhat, but fabric prices have held fairly well. Considerable reluctance is manifested by both buyers and sellers to enter into long future engagements. A gradually improving demand is expected with prices much higher than the February range.

RAINCOAT FABRICS. The raincoat business is several weeks late in starting, but within a short time it will become much more active. Apparently cheap raincoats will be the best sellers this year, and many attractive cloths for such garments are now being offered.

SHEETINGS. The opening of the cotton market after the bank holiday showed an appreciable rise in sympathy with stocks and bonds; yet the gain was soon lost, and prices returned to pre-holiday levels. Consumption has not increased, and production is still proceeding at a very high rate. Future success of the cotton industry depends upon the adjustment of production and consumption in closer correspondence. Meantime converters and retailers are marking time.

TIRE FABRICS. Egyptian and American grades of tire cord have each held at quotations unchanged for the respective several grades and constructions during the past month. Trading is limited on all grades. The consumption of tire fabrics in January was reported at 7,899,233 yards against 12,156,282 yards in January, 1932.

New York Quotations

March 28, 1933

		Cents
Drills		
38-inch 2.00-yard	yd.	\$0.08
40-inch 3.47-yard		.05
50 inch 1.52-yard		.11
52 inch 1.90-yard		.08¾
52-inch 2.20 yard		.08
52-inch 1:85-yard		.09¼
Ducks		
38-inch 2.00-yard D. F.	yd.	.08¼
40-inch 1.45-yard S. F.		.11¾
72 inch 1.05-yard D. F.		.16
72 inch 16.66-ounce		.17½
72-inch 17.21-ounce		.18½
MECHANICAL		
Hose and belting	lb.	.18
TENNIS		
52-inch 1.35-yard	yd.	.12½
Hollands		
GOLD SEAL		
40-inch No. 72	yd.	.14
RED SEAL		
36-inch	yd.	.11
40-inch		.11½
50-inch		.17½
Osnaburgs		
40-inch 2.34-yard	yd.	.07¼
40-inch 2.48-yard		.06⅝
40 inch 3.00-yard		.05⅝
40-inch 10-ounce part waste		.08½
40-inch 7-ounce part waste		.05⅞
37-inch 2.42-yard		.06½
Raincoat Fabrics		
COTTON		
Bombazine 60 x 64	yd.	.07¼
Bombazine 60 x 48		.06¾
Plaids 60 x 48		.07½
Plaids 48 x 48		.06¾
Surface prints 60 x 64		.08½
Surface prints 60 x 48		.07¾
Print cloth, 38½-inch, 64 x 60		.03¼
Print cloth, 38½-inch, 60 x 48		.02⅞
SHEETINGS, 40-INCH		
48 x 48, 2.50-yard	yd.	.05⅛
48 x 48, 2.85-yard		.04½
64 x 68, 3.15 yard		.05
56 x 60, 3.60-yard		.04¼
44 x 48, 3.75-yard		.03⅞
44 x 40, 4.25-yard		.03¾
SHEETINGS, 36-INCH		
48 x 44, 5.00-yard	yd.	.02⅞
44 x 40, 6.15-yard		.02⅝
Tire Fabrics		
BUILDER		
17¼ ounce 60" 23/11 ply Karded peeler	lb.	.22¼
17¼ ounce 60" 10/5 ply Karded peeler	lb.	.18¼
CHAFER		
14 ounce 60" 20/8 ply Karded peeler	lb.	.22¼
12 ounce 60" 10/4 ply Karded peeler	lb.	.18¼
9¼ ounce 60" 20/4 ply Karded peeler	lb.	.24¼
9¼ ounce 60" 10/2 ply Karded peeler	lb.	.18¼
CORD FABRICS		
23/5/3 Karded peeler, 1 1/16" cotton	lb.	.23½
23/4/3 Karded peeler, 1 1/16" cotton	lb.	.24½
15/3/3 Karded peeler, 1 1/16" cotton	lb.	.21½
13/3/3 Karded peeler, 1 1/16" cotton	lb.	.20½
7/2/2 Karded peeler, 1 1/16" cotton	lb.	.19½
23/5/3 Karded peeler, 1¼" cotton	lb.	29¾
23/5/3 Karded Egyptian	lb.	.35½
23/5/3 Combed Egyptian	lb.	.40¾
LENO BREAKER		
8¼ ounce and 10¼ ounce 60" Karded peeler	lb.	.22¼

Crude Rubber

(Continued from page 58)

down completely, in contrast with their production of 7,500 units the week before.

January statistics for pneumatic casings released by The Rubber Manufacturers Association, Inc., showed a seasonal increase, but not enough to compare with last year's figures. Shipments for the month were 2,596,585 casings, an increase of 42.8% over December, but 20.2% below January, 1932. Production was 2,257,846 casings, an increase of 13.9% over December, but a drop of 34.8% from January, 1932. Casings on hand declined 5.3% below December 31, 1932, and 8.5% under January 31, 1932.

The new Commodity Exchange, Inc., comprising the Rubber Exchange of New York, the National Raw Silk Exchange, the New York Hide Exchange, and the National Metal Exchange, has secured a new home in the International Telephone Building at the corner of Broad and South William Streets, which it will occupy on or about June 1. Each trade group will maintain control over its own commodity, and will at the same time have the privilege of a member for trading in the other commodities. Memberships will be limited to 1,015, which, at \$900 each, will give the new exchange a working capital of \$913,500.

Leaders of each group hailed the merger as a distinct advantage, at a dinner tendered by Col. S. Behn, chairman of the International Telephone & Telegraph Corp.

"This new Commodity Exchange," said Charles Slaughter, president of the Rubber Exchange of New York, Inc., "born at the nadir of the depression is destined, we are confident, to be in the forefront of the return of prosperity."

Buying in the Outside Market tapered off this week, with prices easing off by 1/16 of a point. Ribbed smoked sheets were quoted as follows at the close: Nearbys, 3¢; May-June 3-1/16; July-September 3-3/16; October-December 3-5/16; and January-March 3-7/16.

Tire Production Statistics

	Pneumatic Casings—All Types		
	In-ventory	Produc-tion	Total Shipments
1931	6,219,776	38,992,220	40,048,552
1932	6,115,487	32,067,732	32,200,820
1933			
Jan.	5,789,476	1,806,277	2,077,268
	Inner Tubes—All Types		
1931	6,337,570	38,666,376	40,017,175
1932	5,399,551	29,513,246	30,328,536
1933			
Jan.	4,957,298	1,674,557	2,028,100
	Solid and Cushion Tires		
1931	38,815	136,261	167,555
1932	23,830	97,089	108,581
1933			
Jan.	21,956	5,536	6,868

	Cotton and Rubber Consumption Casings, Tubes, Solid and Cushion Tires		Consumption of Motor Gasoline (100%)
	Cotton Fabric Pounds	Crude Rubber Pounds	Gallons
1931 ...	151,143,715	456,615,428	16,941,750,000
1932 ...	128,981,222	416,577,533	15,698,340,000
1933			
Jan.	7,899,233	27,368,276	1,110,564,000

Rubber Manufacturers Association, Inc., figures representing approximately 80% of the industry with the exception of gasoline consumption.

World Rubber Absorption—Net Imports

	Long Tons			
	Calendar Years		1932	1933
CONSUMPTION	1931	1932	Dec.	Jan.
United States	352,047	314,144	17,046	21,732
United Kingdom	76,583	84,639	6,577	6,798
NET IMPORTS				
Australia ...	7,649	12,576	745	......
Austria	2,970	1,955	163	146
Belgium	11,009	9,519	1,298	......
Canada	25,261	20,917	941	1,189
Czechoslovakia	7,717	9,463	2,602	......
Denmark ...	971	902	73	85
Finland	781	681	80	56
France	46,466	42,506	3,205	5,858
Germany ...	39,688	45,020	4,623	4,241
Italy	10,149	15,293	2,106	......
Japan	43,483	56,028	5,603	7,611
Netherlands .	2,220	2,851	348	308
Norway	820	1,425	110	105
Russia	30,671	30,047	3,720	......
Spain	2,605	4,359	485	252
Sweden	3,788	4,256	281	394
Switzerland .	848	614	65	53
Others	*9,600	*9,600	*800	800
Totals	675,326	666,795	50,871	......
Minus U. S. (Cons.) ..	352,047	314,144	17,046	21,732
Total foreign..	323,279	352,651	33,825	......

* Estimate. *Compiled by Rubber Division, Washington, D. C.*

British Malaya

An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Charing Cross, London, S.W.1, England, gives the following figures for February, 1933:

Rubber Exports: Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham

	February, 1933	
To	Sheet and Crepe Rubber Tons	Latex Concentrated Latex and Revertex Tons
United Kingdom	7,004	99
United States	14,565	185
Continent of Europe...	9,064	110
British possessions	1,546	12
Japan	4,211	...
Other countries	767	1
Totals	37,157	407

Rubber Imports: Actual, by Land and Sea

From	Dry Rubber Tons	Wet Rubber Tons
Sumatra	325	2,733
Dutch Borneo	104	1,515
Java and other Dutch islands	47	12
Sarawak	525	16
British Borneo	128	19
Burma	245	13
Siam	177	91
French Indo-China	141	27
Other countries	43	6
Totals	1,735	4,432

Rubber Goods Production Statistics

		1932												1931
TIRES AND TUBES														
Pneumatic casings		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Dec.
Production	thousands	2,770	3,097	2,937	2,813	3,056	4,515	2,893	2,471	2,031	2,055	1,843	1,586	2,115
Shipments, total	thousands	2,602	2,042	2,363	2,958	3,406	8,293	1,923	2,124	2,466	1,439	1,369	1,455	2,225
Domestic	thousands	2,545	1,973	2,281	2,886	3,325	8,212	1,845	2,065	2,411	1,385	1,306	1,405	2,171
Stocks, end of month	thousands	6,329	7,338	7,902	7,877	7,503	3,700	4,962	5,327	4,877	5,501	5,964	6,115	6,220
Solid and cushion tires														
Production	thousands	9	10	9	8	8	11	10	8	8	6	6	7	10
Shipments, total	thousands	9	10	9	8	8	22	7	8	8	7	6	5	11
Domestic	thousands	9	9	9	8	8	22	7	7	7	7	5	5	10
Stocks, end of month	thousands	37	37	37	36	35	23	25	25	24	24	23	24	39
Inner tubes														
Production	thousands	2,719	3,057	2,802	2,580	2,727	4,223	2,350	2,199	2,081	1,749	1,604	1,423	2,078
Shipments, total	thousands	2,803	2,182	2,149	2,708	3,094	7,394	1,728	2,002	2,478	1,327	1,263	1,379	2,213
Domestic	thousands	2,761	2,135	2,094	2,658	3,035	7,336	1,674	1,966	2,440	1,292	1,221	1,348	2,172
Stocks, end of month	thousands	6,175	7,008	7,008	7,553	7,131	3,943	4,780	4,902	4,602	4,971	5,330	5,400	6,338
Raw material consumed														
Fabrics	thous. of lbs.	12,156	12,518	11,292	11,084	12,045	17,480	11,707	10,116	8,417	8,345	7,827	5,993	7,981
MISCELLANEOUS PRODUCTS														
Rubber bands, shipments	thous. of lbs.	206	208	223	202	187	180	160	199	210	315	170	138	231
Rubber clothing, calendered														
Orders, net	no. coats and sundries	20,720	12,388	13,970	7,303	12,503	10,433	9,109	13,321	31,577	35,417	22,353	6,827	13,654
Production	no. coats and sundries	10,130	20,405	17,649	9,711	12,886	15,333	26,849	28,284	22,770	35,306	38,704	25,759	16,221
Rubber-proofed fabrics, production, total	thous. of yds.	2,184	2,448	2,462	2,092	1,748	2,243	2,013	2,952	4,510	4,918	3,890	1,772	2,074
Auto fabrics	thous. of yds.	339	233	312	202	197	308	224	268	301	404	332	234	380
Raincoat fabrics	thous. of yds.	853	883	754	701	556	744	1,003	1,489	2,719	3,065	2,461	707	931
Rubber flooring, shipments	thous. of sq. ft.	349	376	422	546	399	546	329	434	421	383	307	252	587
Rubber and canvas footwear														
Production, total	thous. of pairs	3,557	3,777	3,787	4,104	4,518	4,429	2,321	3,576	3,767	4,139	5,007	4,782	4,469
Tennis	thous. of pairs	2,496	3,226	3,187	3,446	3,485	2,898	1,197	1,375	1,190	1,055	1,385	1,603	2,078
Waterproof	thous. of pairs	1,061	552	600	657	1,033	1,531	1,124	2,201	2,577	3,084	3,623	3,179	2,391
Shipments, total	thous. of pairs	3,990	4,454	4,998	5,073	5,049	4,345	2,985	3,342	4,641	5,234	5,375	4,813	4,208
Tennis	thous. of pairs	2,374	3,411	4,264	4,374	4,603	3,839	1,778	1,208	1,249	600	454	551	734
Waterproof	thous. of pairs	1,616	1,043	735	698	446	506	1,206	2,134	3,393	4,634	4,922	4,262	3,474
Shipments, domestic, total	thous. of pairs	3,962	4,416	4,943	5,010	4,966	4,285	2,942	3,272	4,589	5,189	5,330	4,773	4,054
Tennis	thous. of pairs	2,353	3,378	4,216	4,333	4,530	3,786	1,755	1,175	1,226	571	422	168	616
Waterproof	thous. of pairs	1,610	1,038	727	677	436	499	1,187	2,096	3,363	4,618	4,908	4,254	3,438
Stocks, total, end of month	thous. of pairs	20,237	19,551	19,347	18,381	17,879	17,962	17,317	17,358	16,483	15,388	15,038	15,016	20,628
Tennis	thous. of pairs	8,510	8,264	8,191	7,267	6,163	5,222	4,641	4,615	4,556	5,010	5,955	7,016	8,387
Waterproof	thous. of pairs	11,726	11,287	11,156	11,115	11,716	12,741	12,676	12,743	11,928	10,378	9,083	8,000	12,241
Rubber heels														
Production	thous. of pairs	12,316	14,787	16,368	11,737	10,259	11,299	9,868	11,073	14,205	16,736	14,162	12,433	14,138
Shipments, total	thous. of pairs	12,425	13,583	13,514	9,874	10,270	12,304	10,141	14,395	18,000	16,222	13,188	13,641	13,294
Export	thous. of pairs	290	259	305	280	275	266	261	187	297	233	184	258	474
Repair trade	thous. of pairs	3,431	4,575	3,785	2,656	3,651	3,708	2,449	4,260	5,520	5,012	3,966	2,423	4,622
Shoe manufacturers	thous. of pairs	8,704	8,748	9,424	6,938	6,345	8,330	7,432	9,948	12,183	10,977	9,038	10,960	8,198
Stocks, end of month	thous. of pairs	24,515	25,807	27,933	28,340	28,782	27,736	27,397	24,449	20,534	21,029	21,749	20,337	24,405
Rubber soles														
Production	thous. of pairs	3,411	3,461	3,953	2,292	2,488	2,461	2,419	2,599	4,054	5,081	4,780	4,647	3,639
Shipments, total	thous. of pairs	3,226	3,213	3,573	2,340	2,703	2,500	2,407	2,660	4,353	4,792	4,420	5,265	3,488
Export	thous. of pairs	8	3	2	1	4	5	14	12	7	4	5	6	25
Repair trade	thous. of pairs	264	285	252	252	151	133	113	140	215	269	316	209	267
Shoe manufacturers	thous. of pairs	2,954	2,925	3,320	2,087	2,549	2,362	2,280	2,508	4,131	4,519	4,099	5,050	3,196
Stocks, end of month	thous. of pairs	2,085	2,428	2,691	2,759	2,434	2,374	2,308	2,373	2,024	2,168	2,559	2,369	2,018
Mechanical rubber goods, shipments														
Total	thous. of dollars	2,463	2,446	2,638	2,613	2,542	2,672	2,024	2,152	1,975	2,192	1,990	1,949	2,381
Belting	thous. of dollars	483	483	491	430	420	526	524	563	456	481	423	383	474
Hose	thous. of dollars	903	966	1,174	1,251	1,131	1,095	734	785	706	844	709	758	919
Other	thous. of dollars	1,077	997	973	932	991	1,051	766	804	813	867	858	808	988

Source: *Survey of Current Business*, Bureau of Foreign and Domestic Commerce, Washington, D. C.

CLASSIFIED ADVERTISEMENTS

SITUATIONS WANTED

RUBBER CHEMIST OR ASSISTANT SUPERINTENDENT, WITH years of practical experience here and abroad, is looking for a new, permanent connection. Familiar with laboratory research development and factory control work. Experienced in the manufacture of tires, tubes, hose, druggists' sundries, coated fabrics, tapes for various purposes, hot and cold plastics, and footwear. At present with large manufacturer of seamless goods, both cement and latex. Very best references. Would go abroad. Address Box No. 194, care of INDIA RUBBER WORLD.

MAN, TWENTY-EIGHT, 6 YEARS' BROAD, PRACTICAL, AND technical experience in rubber industry with large companies. Knowledge compounding. Address Box No. 177, care of INDIA RUBBER WORLD.

CALENDER AND MILL ROOM FOREMAN, THOROUGH PRACtical experience on mechanicals, tires and tubes. Efficient manager with executive ability. At present employed in responsible position with large rubber company. Desires new permanent connection. Best of reasons for seeking change. A-1 references from past and present employers. Would go abroad. Address Box No. 178, care of INDIA RUBBER WORLD.

GENERAL FOREMAN. PRACTICAL MAN WITH 12 YEARS OF experience in rubberizing all kinds of fabrics, both single and double textures, raincoat materials, and suede cloth. Complete knowledge of calender, mill room, spreading, curing, and compounding. Thoroughly understands the working of all equipment. Address Box No. 183, care of INDIA RUBBER WORLD.

RUBBER CHEMIST: INTERESTED IN LATEX DEVELOPMENT. Special experience with accelerators, age resisters, paints and plastics. Seven years with large concern. Married; age 31. Available at once. Address Box No. 187, care of INDIA RUBBER WORLD.

FACTORY MANAGER AND DEVELOPMENT MAN, EXPERIENCED in both soft and hard rubber mechanicals, calenders, mills, and presses. Knowledge of compounding. Reputed excellent handler of men. Address Box No. 189, care of INDIA RUBBER WORLD.

SITUATIONS WANTED—Continued

TIME STUDY AND WAGE INCENTIVE MAN, 12 YEARS' experience in modern manufacturing production methods, especially extruded and molded rubber products, reclaimed rubber, etc., would like connection with manufacturer desiring installation of piece work or bonus system. Thorough knowledge cost compilation, sales methods, etc. Excellent record of accomplishment. Reasonable compensation requirements. Address Box No. 192, care of INDIA RUBBER WORLD.

CHEMIST, B.SC., AGE 37, MARRIED, 12 YEARS' EXPERIENCE in alkalis, heavy chemicals, organic accelerators and analyses, rubber and rubber reclaiming, etc. Desires permanent position in rubber or allied industry. Address Box No. 193, care of INDIA RUBBER WORLD.

LATEX SPECIALIST, CHEMIST THOROUGHLY VERSED IN colloidal compounding and technical application. Immediately available. Address Box No. 195, care of INDIA RUBBER WORLD.

POSITION WANTED AS SUPERVISOR. THOROUGHLY PRACtical in the manufacture of calendered clothing, auto top, leatherette, suede cloth, double napped sheeting, hospital sheeting, rubberizing, double and single, backing cloth, pure gum sheetings, rubber substitutes and colors. Practical compounder. Understand all cures, varnishes and machinery. Address Box No. 196, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

WANTED: MAN EXPERIENCED IN THE FUNDAMENTALS OF rubber compounding, processes, and rubber machinery. In replying give the following information: age, education, positions held, with companies' names and immediate superiors. Also advise whether you have contributed articles to any magazines on the subject of rubber, and if possible, enclose copies of these articles, as position requires aptitude for research and the preparation of articles. State salary required. All replies will be treated in a strictly confidential manner. Address Box No. 188, care of INDIA RUBBER WORLD.

(*Advertisements continued on page 71*)

United States Statistics

Imports of Crude and Manufactured Rubber

	December, 1932		Twelve Months Ended December, 1932	
UNMANUFACTURED—*Free*	Pounds	Value	Pounds	Value
Crude rubber	70,299,703	$2,360,061	917,468,414	$31,936,459
Liquid latex	1,415,453	79,250	11,388,156	601,999
Jelutong or pontianak	617,659	36,298	10,318,871	616,596
Balata	48,194	5,209	1,584,767	147,403
Gutta percha	11,133	789	425,217	27,583
Siak, scrap, and reclaimed	731,957	2,451	5,942,096	54,860
Totals	73,124,099	$2,484,058	947,127,521	$33,384,900
Chicle, crude . . . *Free*	371,605	$120,172	4,947,845	$2,022,973
MANUFACTURED—*Dutiable*				
Tires . . . *number*	2,655	$11,258	40,706	$216,875
Other rubber manufactures	......	64,354	......	671,038
Totals	......	$75,612	......	$887,913

Exports of Foreign Merchandise

RUBBER AND MANUFACTURES				
Crude rubber	1,878,840	$68,674	46,882,562	$2,015,612
Balata	8,512	1,528	217,732	42,611
Guayule	1,100	132	15,900	1,913
Gutta percha, rubber substitutes, and scrap	100	65	40,961	3,801
Rubber manufactures	......	454	......	7,496
Totals	....	$70,853	......	$2,071,433

Exports of Domestic Merchandise

RUBBER AND MANUFACTURES				
Reclaimed	454,794	$13,642	7,920,642	$311,550
Scrap and old	3,764,604	49,886	49,112,147	781,234
Rubberized automobile cloth, *sq. yd.*	32,415	16,214	506,458	205,520
Other rubberized piece goods and hospital sheeting . *sq. yd.*	54,366	16,547	664,881	215,346
Footwear				
Boots . . . *pairs*	8,343	16,295	111,204	227,800
Shoes . . . *pairs*	4,332	2,375	216,177	139,629
Canvas shoes with rubber soles . . . *pairs*	12,728	7,226	333,267	173,895
Soles . . . *doz. pairs*	1,828	3,647	23,483	50,668
Heels . . . *doz. pairs*	23,312	12,737	328,558	192,377
Water bottles and fountain syringes . . . *number*	13,245	4,374	219,646	74,470
Gloves . . . *doz. pairs*	5,322	10,049	55,191	118,471
Other druggists' sundries	......	23,901	......	273,264
Balloons . . . *gross*	22,595	24,648	294,356	244,828
Toys and balls	......	3,234	......	43,081
Bathing caps . . . *doz.*	2,496	4,324	44,636	79,577
Bands	21,451	5,853	280,462	82,215
Erasers	19,211	11,414	261,783	152,465
Hard rubber goods				
Electrical goods	112,005	8,777	1,023,644	101,706
Other goods	......	6,854	......	103,322
Tires				
Truck and bus casings, *number*	12,036	199,572	187,096	3,001,695
Other automobile casings, *number*	54,180	353,978	721,366	4,775,764
Tubes, auto . . . *number*	43,674	44,605	573,568	600,898
Other casings and tubes, *number*	1,693	4,212	32,082	73,315
Solid tires for automobiles and motor trucks . *number*	438	10,206	7,820	193,756
Other solid tires	140,523	14,745	1,316,871	163,117
Tire sundries and repair materials	......	29,926	......	492,242
Rubber and friction tape	53,635	12,919	636,259	147,163
Belting	131,630	55,110	1,485,551	623,270
Hose	227,163	58,017	2,590,723	676,907
Packing	79,188	30,300	955,630	350,502
Thread	145,901	83,622	1,248,535	733,459
Other rubber manufactures	......	85,852	......	961,163
Totals	......	$1,225,061	......	$16,364,669

World Rubber Shipments—Net Exports

Long Tons

	Calendar Years		1932		1933	
British Malaya	1931	1932	Nov.	Dec.	Jan.	Feb.
Gross exports	519,740	478,252	40,098	40,118	46,599	37,564
Imports	125,506	92,539	10,072	10,089	7,857	6,167
Net	394,234	385,713	30,026	30,029	38,742	31,397
Ceylon	61,766	49,714	4,146	5,801	4,641	5,039
India and Burma	8,470	3,888	185	367	318	......
Sarawak	10,451	6,960	683	644	590	541
British N. Borneo	6,097	4,951	400	400	400	400
Siam	4,218	3,451	371	406	305	368
Java and Madura	75,952	61,312	4,368	4,683	4,766	......
Sumatra E. Coast	87,747	79,837	6,250	7,066	5,630	......
Other N. E. Indies	116,009	85,871	9,080	8,594	6,729	......
French Indo-China	11,713	14,376	809	1,704	968	......
Amazon Valley	12,121	6,450	1,164	824	554	......
Other America	222	39	2	......	......	......
Africa	3,072	1,751	154	124	100	100
Totals	792,072	704,313	57,638	60,642	63,743	......

Compiled by Rubber Division, Washington, D. C.

Rubber Questionnaire Fourth Quarter, 1932*

	Long Tons			
RECLAIMED RUBBER	Inventory at End of Quarter	Production	Shipments	Consumption
Reclaimers solely (5)	3,698	7,472	7,426	....
Manufacturers who also reclaim (21)	5,118	10,435	4,639	6,535
Other manufacturers (69)	2,553	....	....	6,117
Totals	11,369	17,907	12,065	12,652

	Long Tons		
SCRAP RUBBER	Inventory	Consumption	Due on Contract
Reclaimers solely (5)	18,370	8,014	2,551
Manufacturers who also reclaim (14)	41,003	11,498	4,943
Other manufacturers (10)	171	....	....
Totals	59,544	19,512	7,494

Tons of Rubber Consumed in Rubber Products and Total Sales Value of Shipments

PRODUCTS	Crude Rubber Consumed Long Tons	Total Sales Value of Shipments of Manufactured Rubber Products
Tires and Tire Sundries		
Automobile and motor truck pneumatic casings	§36,005	§$33,451,000
Automobile and motor truck pneumatic tubes	5,545	4,291,000
Motorcycle tires (casings and tubes)	‡	‡
Bicycle tires (single tubes, casings, and tubes)	327	414,000
Airplane casings and tubes	15	66,000
Solid and cushion tires	317	412,000
All other solid tires	40	93,000
Tire sundries and repair materials	762	1,840,000
Totals	43,011	$40,567,000
Other Rubber Products		
Mechanical rubber goods	3,476	$10,098,000
Boots and shoes	4,396	13,605,000
Insulated wire and insulating compounds	511	†1,785,000
Druggists' sundries, medical and surgical rubber goods	449	1,401,000
Stationers' rubber goods	265	263,000
Bathing apparel	203	58,000
Rubber clothing	172	745,000
Automobile fabrics	181	613,000
Other rubberized fabrics	972	2,135,000
Hard rubber goods	233	†899,000
Heels and soles	3,320	3,739,000
Rubber flooring	202	462,000
Sporting goods, toys, and novelties	315	837,000
Miscellaneous, not included in any of the above items	1,307	2,008,000
Totals	16,002	$38,648,000
Grand totals—all products	59,013	$79,215,000

Inventory of Rubber in the United States and Afloat

	Long Tons			
ON HAND	Plantation	Para	All Others	Totals
Manufacturers	275,317	1,734	159	277,210
Importers and dealers	60,364	535	163	61,062
Totals on hand	335,681	2,269	322	338,272
AFLOAT				
Manufacturers	7,515	....	....	7,515
Importers and dealers	30,382	167	....	30,549
Totals afloat	37,897	167	....	38,064

*Number of rubber manufacturers that reported data was 158; crude rubber importers and dealers, 39; reclaimers (solely), 5; total daily average number of employes on basis of third week of Oct., 1932, was 96,868.

It is estimated that the reported grand total crude rubber consumption and the grand total sales value figures to be approximately 92 per cent; the grand total crude rubber inventory, 87 per cent; afloat figures unavailable; the reclaimed rubber production, 96 per cent; reclaimed consumption, 86 per cent; and reclaimed inventory 93 per cent of the total of the entire industry.

†One company did not report its sales, but did report crude rubber consumption, stocks, etc.

‡Included in automobile and motor truck pneumatic casings. §Includes motorcycle tires (casings and tubes).

Compiled from statistics supplied by The Rubber Manufacturers Association, Inc.

London Stocks, January, 1933

			Stocks, January 31		
LONDON	Landed Tons	Delivered Tons	1933 Tons	1932 Tons	1931 Tons
Plantation	2,764	3,692	36,430	67,129	80,991
Other grades	8	6	51	37	49
LIVERPOOL					
Plantation	*1,662	*4,253	*52,569	*58,110	*43,292
Total tons, London and Liverpool	4,434	7,951	89,050	125,276	124,332

* Official returns from the recognized public warehouses.

Classified Advertisements
CONTINUED

SITUATIONS OPEN—Continued

WANTED: MECHANICAL RUBBER GOODS SALESMEN BY OLD established house. One to cover Montana and Wyoming. One for New Mexico and western part Kansas and Nebraska. Must have experience and show record of sales. Address Box No. 180, care of INDIA RUBBER WORLD.

WE DESIRE TO LOCATE A THOROUGHLY PRACTICAL MAN experienced in rubberizing fabrics. One who is capable of supervising spreader, calender, mill, churn and vulcanizing rooms, who understands compounding and the handling of labor. Must be able to create and produce. Replies must give complete history of self as well as former positions, experience, and salary expected. Reply to Box No. 181, care of INDIA RUBBER WORLD.

FACTORY MANAGER WANTED FOR MECHANICAL RUBBER plant on Pacific Coast. Must be capable of taking complete charge. State past experiences and references. Address reply to Box No. 190, care of INDIA RUBBER WORLD.

WANTED: PRACTICAL, THOROUGHLY EXPERIENCED, ALL around rubber man with special knowledge of coatings, tapes, sundries. Give fullest particulars regarding self. Midwest factory. Address Box No. 191, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

MANUFACTURER IS DESIROUS OF GETTING IN TOUCH WITH party who has new rubber ideas for purpose of manufacturing and selling. Address Box No. 179, care of INDIA RUBBER WORLD.

SALESMAN CALLING ON MECHANICAL RUBBER JOBBING trade in New York area open for additional lines. Address Box No. 182, care of INDIA RUBBER WORLD.

DEVELOPED A VERY SIMPLE, INEXPENSIVE AND EFFICIENT process for vulcanizing rubber to metal. No cements required. Address Box No. 184, care of INDIA RUBBER WORLD.

HAVE COMPLETE EQUIPMENT FOR TIRE FACTORY OR addition. Will exchange for interest in reliable company and active connection. Address Box No. 185, care of INDIA RUBBER WORLD.

MACHINERY AND SUPPLIES FOR SALE

COMPLETE LINE OF W. & P. MIXERS, VACUUM SHELF DRIERS, calenders, mills, colloid mills, pebble mills, dough mixers, hydraulic presses, pumps, etc. Rebuilt, guaranteed. What machinery have you for sale? CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, N. Y. C.

GARDNER AIR COMPRESSOR AND MOTOR; BANNER VACUUM boxes; vacuum pump motor and tank; Adamson accumulator; 2 sets tire molds with bag, molds, and rings; Thropp 60" mills; calenders; pumps; collapsible building drums, etc. Will sell or trade all or any part for tires. Address Box No. 186, care of INDIA RUBBER WORLD.

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	December, 1932		Nine Months Ended December, 1932	
UNMANUFACTURED	Pounds	Value	Pounds	Value
Rubber, gutta percha, etc....	2,108,590	$87,511	33,286,547	$1,403,489
Rubber, recovered	240,900	8,878	3,248,200	128,954
Rubber and gutta percha scrap	88,200	1,247	1,204,100	17,306
Balata	....	....	13,900	3,240
Rubber substitute	6,900	1,616	169,800	23,989
Totals	2,444,590	$99,252	37,922,547	$1,576,978
PARTLY MANUFACTURED				
Hard rubber sheets and rods..	2,468	$855	9,902	$7,146
Hard rubber tubes...........	....	132	....	4,265
Rubber thread not covered....	4,435	4,304	88,201	69,554
Totals	6,903	$5,291	98,103	$80,965
MANUFACTURED				
Belting	....	$2,330	....	$35,661
Hose	....	3,092	....	30,311
Packing	....	2,798	....	27,390
Boots and shoes.........*pairs*	40,143	17,467	113,143	49,503
Clothing including waterproofed	....	533	....	9,112
Raincoats ....*number*	458	1,535	7,486	26,640
Gloves	....	779	....	4,906
Hot water bottles............	....	456	....	13,852
Tires, bicycle ....*number*	138	45	29,901	15,766
Pneumatic ....*number*	245	4,107	10,513	79,580
Inner tubes ....*number*	34	156	621	2,087
Solid for automobiles and motor trucks......*number*	25	548	364	18,889
Other solid tires...........	....	1,111	....	9,798
Mats and matting...........	....	3,316	....	34,230
Cement	....	1,609	....	39,002
Golf balls ....*dozen*	571	1,726	29,496	88,798
Heels ....*pairs*	3,450	248	74,354	5,391
Other rubber manufactures...	....	39,086	....	491,831
Totals	....	$80,942	....	$982,747
Totals, rubber imports...	....	$185,485	....	$2,640,690

Exports of Domestic and Foreign Rubber Goods

UNMANUFACTURED	Produce of Canada Value	Reexports of Foreign Goods Value	Produce of Canada Value	Reexports of Foreign Goods Value
Waste rubber	$2,706	....	$20,137	....
MANUFACTURED				
Belting	$9,313	....	$136,495	....
Canvas shoes with rubber soles.	8,386	....	432,103	....
Boots and shoes..............	146,047	....	1,334,003	....
Clothing, including waterproofed	2,853	....	40,478	....
Heels	16,036	....	167,202	....
Hose	3,690	....	52,168	....
Soles	8,049	....	107,790	....
Tires, bicycle	....	....	64	....
Pneumatic	239,532	....	2,276,086	....
Inner tubes	14,501	....	137,912	....
Solid	....	....	424	....
Other rubber manufactures...	27,356	$1,847	322,903	$128,543
Totals	$475,763	$1,847	$5,007,628	$128,543
Totals, rubber exports....	$478,469	$1,847	$5,027,765	$128,543

Low and High New York Spot Prices

	March		
PLANTATIONS	1933*	1932	1931
Thin latex crepe..................	3⅝/3⅞	4 3/16/4⅝	7⅛/8⅝
Smoked sheet, ribbed..............	2 15/16/3 3/16	3 /3⅝	6⅞/8⅜
PARAS			
Upriver fine	6	5 /5¼	9 /9⅜

* Figured to March 28, 1933. All prices in cents per pound.

Imports by Customs Districts

	January, 1933 *Crude Rubber		January, 1932 *Crude Rubber	
	Pounds	Value	Pounds	Value
Massachusetts	5,366,318	$182,898	4,823,195	$228,283
Buffalo	67,200	2,226	.....	.....
New York	54,458,429	1,811,741	53,667,380	2,511,537
Philadelphia	212,960	6,912	......	......
Maryland	2,594,738	78,388	5,043,058	193,467
Mobile	505,930	14,055	......	......
Georgia	......	......	1,102,920	36,787
New Orleans	797,452	71,017	.....	......
Los Angeles	3,783,733	113,266	9,561,454	408,462
San Francisco	78,297	2,746	566,000	27,000
Oregon	......	......	22,400	1,199
Ohio	101,943	4,909	34,437	2,033
Colorado	717,150	26,570	336,250	19,350
Totals	68,684,150	$2,314,728	75,157,094	$3,428 118

*Crude rubber including latex dry rubber content.

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

No.	COMMODITY	CITY AND COUNTRY
†3,218	Rubber shoes and galoshes..............	Dresden, Germany
‡3,219	Belting	Lisbon, Portugal
†3,249	Druggists' sundries	San Juan, Porto Rico
*3,271	Tires and tubes......................	Guayaquil, Ecuador
†3,273	Raincoats, weatherproof coats, raincoat materials, rubberized cloth, etc...........	Berlin, Germany
*3,295	Automobile top patches................	Winnipeg, Canada
*3,297	Automobile individual (full circle) tire vulcanizers	Stockholm, Sweden
*3,319	Vulcanized rubber thread..............	Warsaw, Poland
*†3,320	Canvas shoes	San Juan, Porto Rico
*†3,330	Scrap rubber and new virgin rubber......	Bilbao, Spain
*†3,339	Rubber goods	Winnipeg, Canada
*†3,346	Tires	Rio de Janeiro, Brazil
*†3,364	Carbon black, accelerators, antioxidants, and dyes for rubber manufacture........	Osaka, Japan
*†3,372	Druggists' sundries	Warsaw, Poland
*†3,379	Friction tape	Istanbul, Turkey
*†3,381	Tires	Rio de Janeiro, Brazil
*†3,418	Friction tape	Sao Paulo, Brazil
*3,450	Automobile hose	Medan, Sumatra
*3,452	Carbon black	Hamburg, Germany
*3,473	Rubber sundries	Winnipeg, Canada
*3,495	Shoes	Leipzig, Germany
*†3,498	Raincoats	Oslo, Norway
*3,507	Rubberized cotton girdles..............	Port au Prince, Haiti

*Purchase. †Agency. *†Purchase or agency. ‡Purchase or agency, or both.

Plantation Rubber Crop Returns by Months

	Borneo (26 Companies)		Ceylon (102 Companies)		India and Burma (21 Companies)		Malaya (338 Companies)		Netherlands East Indies — Java (60 Companies)		Netherlands East Indies — Sumatra (60 Companies)		Miscellaneous (8 Companies)		Total (615 Companies)	
1932	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index
January	352	72.0	1,378	67.5	208	37.0	14,409	115.9	2,780	105.9	4,712	116.9	212	117.1	24,051	107.5
February	336	68.7	738	36.2	82	14.6	11,854	95.3	2,701	102.9	3,894	96.6	120	66.3	19,725	88.2
March	365	74.6	1,187	58.2	152	27.0	11,355	91.3	3,017	114.9	4,210	104.4	143	79.0	20,429	91.4
April	318	65.0	1,209	59.2	149	26.5	11,991	96.4	2,609	99.4	4,046	100.3	163	90.1	20,485	91.6
May	277	56.6	897	43.9	99	17.6	12,711	102.2	2,373	90.4	4,257	105.6	171	94.5	20,785	92.9
June	298	60.9	1,196	58.6	36	6.4	12,353	99.3	2,166	82.5	4,151	103.0	167	92.3	20,367	91.1
July	308	63.0	1,221	59.8	16	2.8	13,069	105.1	2,078	79.1	4,062	100.7	140	77.3	20,894	93.4
August	307	62.8	954	46.7	30	5.3	12,728	102.4	1,616	61.5	3,960	98.2	134	74.0	19,729	88.2
September	293	59.9	1,096	53.7	44	7.8	11,635	93.6	1,494	56.9	4,242	105.2	116	61.7	18,920	84.6
October	342	69.9	976	47.8	97	17.3	12,254	98.6	2,157	82.1	4,109	102.0	118	65.2	20,053	89.7
November	343	70.1	1,194	58.5	132	23.5	11,813	95.0	2,440	92.9	4,086	101.3	135	74.6	20,143	90.1
December	365	74.6	1,554	76.1	157	27.9	13,770	110.7	2,334	88.9	4,195	104.0	126	69.6	22,501	100.6
TOTALS	3,904	.	13,600	...	1,202	...	149,942	...	27,765	...	49,924	...	1,745	...	248,082	...
MONTHLY AVERAGE......	325	66.5	1,133	55.5	100	17.8	12,495	100.5	2,314	88.1	4,160	103.2	145	80.1	20,674	92.4
1933 January	352	72.0	1,141	55.9	120	21.4	12,527	100.7	2,463	93.8	4,043	100.3	125	69.1	20,771	92.9
1932 January	352	72.0	1,378	67.5	208	37.0	14,409	115.9	2,780	105.9	4,712	116.9	212	117.1	24,051	107.5
1931 January	473	96.7	1,776	87.0	397	70.6	13,006	104.6	3,020	115.0	4,324	107.2	225	124.3	23,221	103.8
1930 January	523	107.0	2,280	111.7	652	116.0	14,037	112.9	2,999	114.2	4,526	112.3	223	123.2	25,240	112.9
1929 January	505	103.3	2,233	109.4	598	106.4	13,697	110.2	2,710	103.2	4,453	110.4	190	105.0	24,386	109.0

NOTE. Index figures throughout are based on the monthly average for 1929 = 100. Issued February 27, 1933, by the Commercial Research Department, The Rubber Growers' Association, Inc., London, England.

rld

31
85⅝
83⅝

93⅜

lue
,283
.537
,467
,787
.462
,000
,199
,033
,350
3 118

ress
estic

y

Rico

Rico

azil

razil

aiti
, or

ies)

ndex
07.5
88.2
91.4
91.6
92.9
91.1
93.4
88.2
84.6
89.7
90.1
00.6
02.4
92.9
07.5
03.8
12.9
09.0

ent,